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DEPARTMENT BULLETIN No. 1282

Washington, D. C. ▼ December, 1924

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ALMOND VARIETIES IN THE UNITED STATES

By

MILO N. WOOD, Pomologist, Office of Horticultural Investigations
Bureau of Plant Industry

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By Milo N. Wood, *Pomologist, Office of Horticultural Investigations, Bureau of Plant Industry*

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EARLY ATTEMPTS AT ALMOND GROWING IN THE UNITED STATES

The first attempts to grow the edible almond in the United States were made in the New England and Middle Atlantic States as early as 1840, but resulted in failure because of the rigors of the climate. In 1843 a planting of almond trees received from one of the Eastern States was made in California, and later almonds were planted to some extent in nearly all the States along the Atlantic seaboard, on the Gulf Coast, and in the West. Most of these plantings came to naught, because, even in mild climates, the early blooming of the almond rendered the blossoms liable to injury from spring frosts, with the result that crops were not secured often enough to be worth while. Of all the States, California seemed the best adapted to commercial almond production, but even there it was finally learned that only those sections specially favored with good air drainage and freedom from late spring frosts could be utilized profitably for this purpose. Although there have been several periods of serious depression, the industry in California has grown until to-day (1923) the area in bearing and in young nonbearing trees comprises about 90,000 acres, while the annual production during the last few years has been from 5,000 to slightly more than 11,000 tons of almonds in the shell. California produces 98 per cent of all the almonds grown in the United States.

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[1] This bulletin is based on critical studies of almond varieties which have been in progress since the spring of 1920.

ALMOND-GROWING DISTRICTS IN CALIFORNIA

Almonds succeed in various localities in California from Shasta County in the north to Riverside County in the south, a distance of some 700 miles. But while the California almond belt is thus equal in length to the distance from the southern boundary of New York to central Georgia, in width it rarely exceeds 60 miles. The Sacramento and San Joaquin Valleys with their adjacent foothill districts produce the bulk of the almond crop. The map (fig. 1) shows the important almond-growing sections numbered, while Table 1 refers to the districts by number and by name and enumerates the localities included in each district. In the variety descriptions refer-

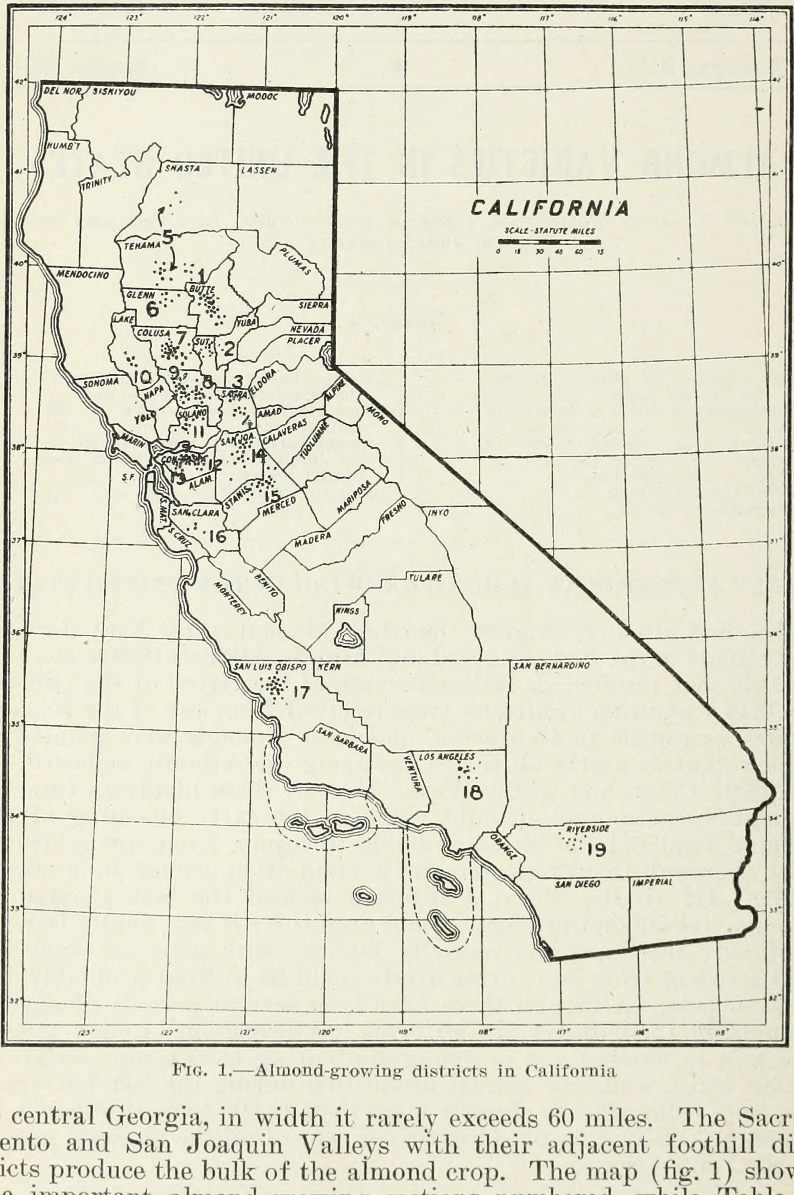
CALIFORNIA
SCALE-STATUTE MILES
0 15 30 45 60 75
DEL NOR
SISKIYOU
MODOC
HUMB'T
TRINITY
SHASTA
LASSEN
TEHAMA
5
PLUMAS
MENDOCINO
1
BUTTE
GLENN
6
SIERRA
YUBA
LAKE
COLUSA
7
SUT.
2
NEVADA
PLACER
10
9
8
3
SONOMA
NAPA
SACRA.
ELDORA.
ALPINE
MONO
YOLO
SOLANO
4
AMAD
11
SAN JOA.
CALAVERAS
TUOLUMNE
MARIN
14
CON.
12
S.F.
13
ALAM.
STANIS.
15
MERCED
MARIPOSA
FRESNO
INYO
S.MAT.
SAN CLARA
16
S.CRUZ
MADERA
S.BENITO
MONTEREY
TULARE
KINGS
SAN LUIS OBISPO
KERN
17
SAN BERNARDINO
SAN BARBARA
VENTURA
LOS ANGELES
18
ORANGE
RIVERSIDE
19
SAN DIEGO
IMPERIAL
124° 123° 122° 121° 120° 119° 118° 117° 116° 115° 114°
42° 41° 40° 39° 38° 37° 36° 35° 34° 33° 32°

FIG. 1.—Almond-growing districts in California

ence is made both to the districts and to the localities. The district names are taken arbitrarily as a matter of convenience. No attempt has been made to arrange them according to production or acreage.

TABLE 1.—*Principal almond-growing districts in California*

Number and name of district	County	Localities within the district
1. Chico	Butte Tehama	Chico, Durham, Biggs, East Biggs, and Gridley. Los Molinos.
2. Live Oak–Pennington	Sutter Yuba	Live Oak, Pennington, Yuba City, and Sutter. Marysville.
3. Fairoaks	Sacramento Placer	Fairoaks and Antelope. Country adjacent to Roseville.
4. Sacramento	Sacramento	Mayhews, Routier, and Mills.
5. Corning	Tehama and Shasta.	Corning and portions west of the Sacramento River.
6. Orland	Glenn	Orland.
7. Arbuckle	Colusa	Arbuckle, College City, and Colusa.
8. Winters–Davis	Yolo Solano	Winters, Woodland, and Davis. Dixon.
9. Esparto	Yolo	Madison, Esparto, Capay, Guinda, and Rumsey.
10. Lake	Lake	Lower lake country.
11. Suisun	Solano	Suisun, Fairfield, and Gordon Valley.
12. Oakley	Contra Costa	Antioch, Oakley, Knightsen, and Brentwood.
13. Concord	do	Region near Concord.
14. Lodi–Acampo	San Joaquin	Lodi, Acampo, Stockton, and Linden.
15. Oakdale	Stanislaus	Oakdale, Waterford, Salida, and Modesto.
16. Los Gatos	Santa Clara	Los Gatos, Santa Clara, San Jose, and regions in the Santa Clara Valley.
17. Paso Robles	San Luis Obispo	Paso Robles.
18. Lancaster	Los Angeles	Lancaster and Antelope Valley.
19. Banning	Riverside	Banning.

THE RELATION OF VARIETIES TO THE INDUSTRY

The early plantings of almond trees in California consisted of varieties of European origin. Later, in attempts to obtain varieties better adapted to California conditions, seedlings were grown and the more promising selected for propagation. The total number of varieties in use has been increased in this way to more than 100. While a few of the California varieties, such as the Nonpareil, I. X. L., and Ne Plus Ultra, have proved valuable, most of them are relatively worthless, and their dissemination and cultivation have resulted in much disappointment and loss. The present condition of the industry is unsatisfactory, largely because of the failure to appreciate the fact that in the choice of a variety for cultivation all of the factors relating both to production and marketing must be taken into account. None of these can be disregarded without loss to the grower.

A variety is not satisfactory unless it fulfills the requirements of the grower, the dealer, and the consumer. The ideal almond variety from the producer's standpoint is one that bears regularly and well. The tree should be vigorous, hardy, reasonably resistant to diseases and insect infestation, and of a moderately upright, symmetrical habit of growth, with a head somewhat open in the center (figs. 2 and 3). The blooming period should be rather long and should coincide with the period of least danger of frost in the district. Blossoms should be produced in profusion. The variety should be self-fertile,[2] or at least interfertile with the better commercial varieties. The nuts should be well distributed about the tree and along the branches (fig. 4); they should all ripen at the same time; should, when ripening, remain attached to the tree with sufficient tenacity to prevent dropping during ordinary winds, but not be so firmly attached as to make harvesting difficult; dehiscence of the hulls should be complete enough to make hulling easy, and there should be no "sticktights." The nuts, like the tree, should also be reasonably resistant to insect attacks and diseases.

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[2] So far as is now known, no variety of edible almond is self-fertile.

The requirements of the dealer and consumer are as follows: The nuts should be attractive and uniform in appearance, good keepers, with a bright-colored,[3] soft, smooth, well-sealed shell, easy to crack, and yet free from a spongy or crumbly outer surface. The kernels should be single, large, attractive in shape, free from pubescence, with a good flavor, and preferably with sufficient oil content to satisfy all branches of the confectionery trade.

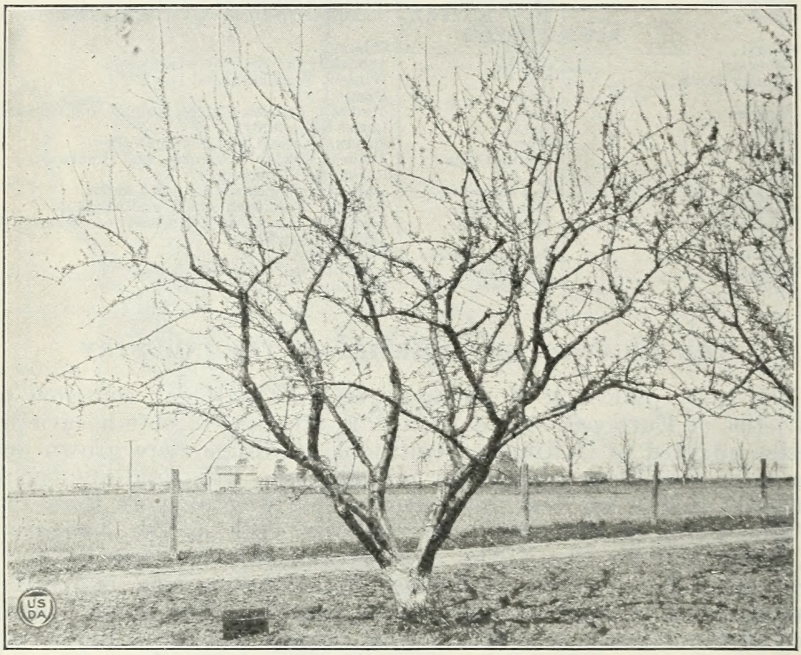

FIG. 2.—A Reams almond tree, showing a spreading type of growth

When the necessity of taking all of these requirements into account is realized, it is not difficult to see why most of the varieties grown in California, whether native in origin or imported, have proved unsatisfactory. In many instances varieties have been widely advertised and extensively planted because they possessed one or at most a few of the desirable qualities, such as a heavy bearing tendency, a thin shell, or an attractive appearance. The fact that they possessed defects so marked as to render them practically worthless was overlooked. More inferior varieties are grown in California today than ever before (over half the total production is from trees of this class), primarily as a result of misdirected efforts to secure better varieties. It is not strange that under these circumstances many orchards are now operated at a loss. Inferior nuts can be disposed of profitably only during periods of abnormal demand. In normal times the market for such nuts collapses, and they can be disposed of only with great difficulty if at all. At best they bring prices which do not give adequate returns to the grower.

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[3] A good color is usually obtained by proper bleaching.

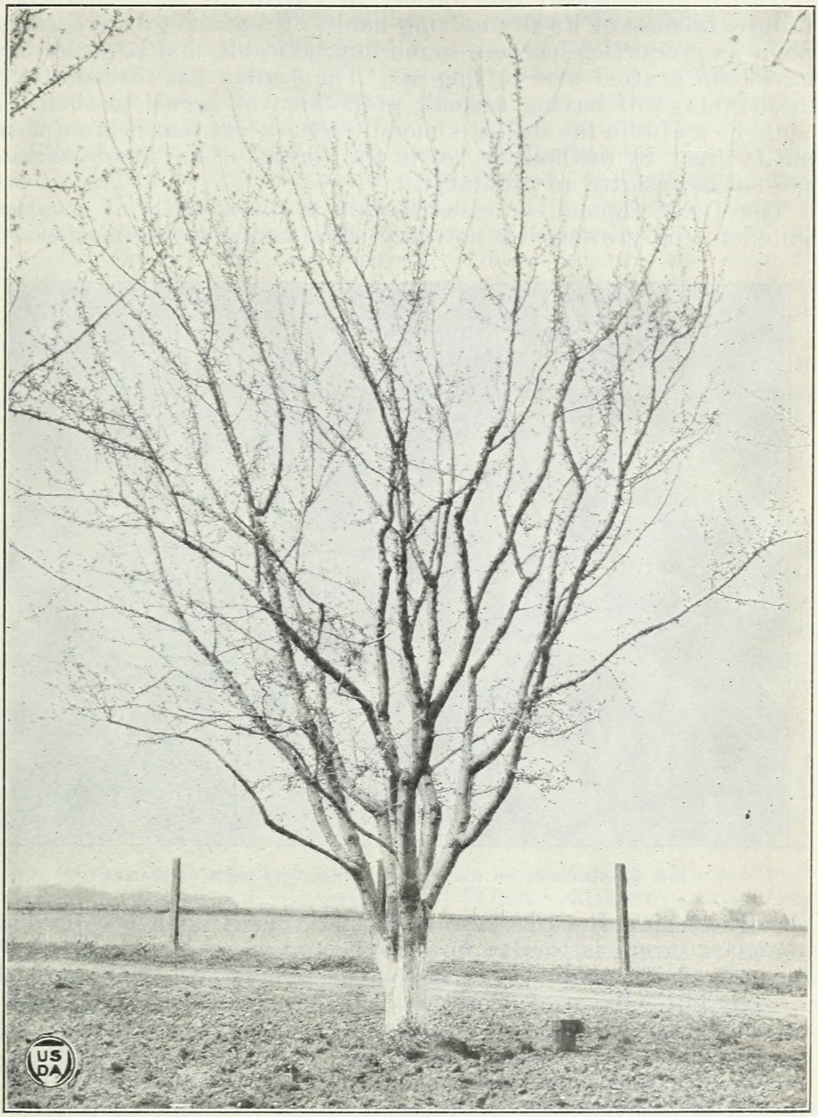

FIG. 3.—A Languedoc almond tree, showing the upright type of growth

The Jordan almond may be cited as an example of a variety not profitable for American production. The kernel is large, smooth, and attractive, with sufficient oil content to make it popular with the confectionery trade. The nut has prestige also in the market. But extensive plantings of this variety in California have resulted in failure, because of its shy bearing habit. From the growers' standpoint its production has been found impracticable, and large acreages have been grafted over or dug up. The Jordan has the additional disadvantage of having a small proportion of kernel to shell. It could be useful in the shelled-almond trade, except that it is a difficult nut to crack by methods in use in California, where hand cracking can not be resorted to profitably.

The Texas almond serves admirably as an example of a variety suited to the grower, but not very satisfactory to the market. It usually escapes frost because of its late blooming habit, produces abundant crops, is thrifty in growth, and is easily harvested; but because of its small size, the comparatively hard shell, and the slightly bitter flavor of its kernel, it is more difficult to dispose of in the shell than are the larger and more attractive nuts of the same general class, for example, the Drake. The kernel of the Texas is plump, attractive in appearance, and quite well suited to the manufacture of confectionery products in which the slightly bitter flavor is not objectionable. In the future it may be possible to dispose of it profitably as a shelled almond, but at present the Texas variety must be classed as one partially failing from the market standpoint. The large acreage of this variety in California now presents a difficult problem.

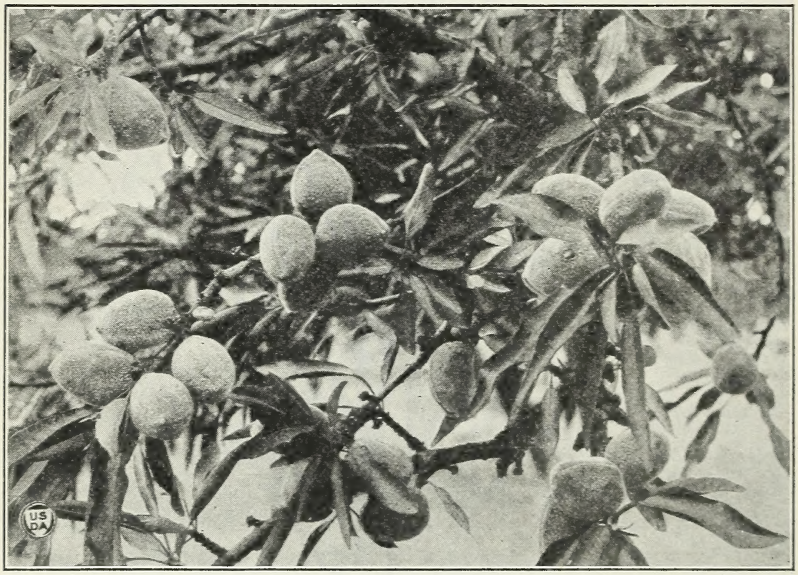

FIG. 4.—Almonds on the tree, showing their habit of bearing

The success of the almond industry in the future will depend more largely upon the character of the varieties grown than upon any other factor. The immediate problem of the individual grower, that of a choice of varieties for his district, is more complicated than would at first appear. For example, in considering so apparently simple a factor as that of yield, the grower must take into account not only the natural bearing habit of the variety but its blooming season, its requirements for pollination, resistance to diseases, and its needs as regards moisture supply, soil, and cultivation, for yield depends upon each and all of these. To the inherent complexity of the problem are added difficulties arising from confusion in nomenclature and from lack of authoritative data regarding varieties.

The chaotic condition of the nomenclature has been a detriment to the industry, from both the growing and the marketing standpoints. The condition is due in part to the fact that the same varieties may vary somewhat in appearance, hardness of shell, and growth of tree in different districts, different seasons, and upon different soils. Foreign varieties have been introduced under one name and propagated and passed along from section to section under other names. The same is true of many varieties originating as seedlings in California. In some instances the original name has been forgotten, with the result that the variety has been reintroduced under a new name. So it happens that the same variety may be known by different names in different localities, and the same name may be used in different localities to designate different varieties. When a buyer orders a certain variety from different sections he may actually receive several varieties, one of which may be the one desired, while the rest are inferior. A striking example of this confusion is seen in the case of the Eureka. Although the authenticity of this variety is well established, for there is no almond nut with more marked distinguishing characteristics, a large coarse seedling variety not resembling the Eureka in the least is known by that name in some localities. Even the best-established varieties are not free from this confusion. At least seven types of almond are known as Drake, five as Ne Plus Ultra, many as I. X. L., and several as Nonpareil. That such a confusion in varieties would exert a bad influence on the marketing phase of the industry is to be expected. The presenting of an almond to the market and the establishing of a steady demand for it requires a great deal of expensive advertising and salesmanship and can be done successfully only with a superior variety produced in large quantities. When a mixture of types enters the market under an established name, there may seem to be little disadvantage to the consumer if the "off types" are equal or superior to the established variety and resemble it rather closely. But when these types are inferior to the established variety the results are loss of confidence on the part of retailer and consumer, lower prices, and finally unstable markets.

It is from the grower's standpoint, however, that the confusion is most disastrous. In many instances growers have set out or purchased orchards which they believed to consist of the better varieties, only to find, after the expenditure of large sums in bringing them into bearing, that the varieties were very inferior. Steps should be taken to insure the taking of budwood for propagation only from trees whose variety has been determined to a certainty.

It would seem that much of the confusion now prevailing in the almond industry might have been avoided if complete and convincing data regarding varieties had been available for the grower. Although short descriptions of a few varieties have appeared in nursery catalogues, newspapers, agricultural journals, and other publications since 1845, there has been no attempt to supply complete data by which they could be identified or to give such information regarding them as would enable the grower to compare the relative merits and faults of varieties and make a rational choice. The investigations of which this bulletin is the result were undertaken with the hope of supplying this information while at the same time laying a foundation for the breeding of better almond varieties. An attempt has been made to analyze the merits of all the known varieties to the fullest extent possible, in order to provide future planters with maximum information relative to varieties and also to place the facts before growers having trees of varieties which should be top-worked.

METHOD OF INVESTIGATIONS

In preparing the material for this bulletin, the following steps have been taken:

(1) A thorough study has been made of all available literature on the subject, from foreign as well as domestic sources.

(2) Investigations have been made at ports of entry of varieties and almond products imported. Methods of handling, buying, wholesaling, and retailing almonds in the main markets of the United States have been carefully studied, both in regard to home-grown varieties and to imported almonds.

(3) Detailed studies have been made of varieties grown in California, involving studies of the characters of the tree, its branches, foliage, flowers, blooming and ripening season, as well as detailed studies of the nuts themselves.

(4) In connection with (3), studies have been made as to bearing habits and of the adaptability of the various varieties to different districts. Incidentally, studies have been made of methods of culture with allowances for thoroughness or neglect in this respect.

In the descriptions more detail has been found necessary than is the case with other fruits. For identification purposes, a study of the nut proved most useful, though if one will attempt to classify plums by the pits, for example, he will appreciate the difficulties involved in classifying almonds by the nuts alone. Therefore all parts of the tree have been studied, and such detail has been given as seemed necessary in view of the large number of varieties and the close resemblance among them. In the descriptions only such characteristics are considered as remain reasonably constant under normal conditions. Under abnormal conditions, as in time of severe drought or excessive irrigation, allowance must be made for variations in some characteristics, such as size of leaves, twig growth, and size of nut.

In addition to the description, the following information is given regarding the varieties:

(*a*) Synonyms for the name of the variety, if any.

(*b*) Brief account of the origin of the variety, such as might be useful for identification purposes.

(*c*) Facts in regard to yield, bearing habits, and ripening dates.

(*d*) Variations in the variety in different districts where such occur and suitability of the variety for various localities.

(*e*) A summary of the good qualities and limitations of each variety, with recommendations regarding it.

With the exception of a few varieties of special interest, only those are described that enter the market in quantities of 1 ton or over annually.

The characteristics most helpful in determining a variety are enumerated as distinguishing characteristics. These are more useful in the rapid comparison of a few varieties and as "guide posts" to set the seeker on the right path than as details sufficient in themselves for purposes of identification. Before final decision is reached the complete description should be gone over carefully, the illustrations consulted, and the variety run down in the key. When practicable, it is advantageous to trace down a known variety before an unknown variety is attempted. This will give a working knowledge of the terms used, as well as material for comparison.

GENERAL CONSIDERATIONS

It is well to recognize the fact that no known variety has yet proved entirely satisfactory for American production. No variety is ideal, and though breeding of almonds is to be undertaken by the United States Department of Agriculture in cooperation with the University of California it will be some time before better varieties can be bred and tested. The grower, therefore, should plant or graft over trees producing inferior nuts to the best varieties now available, not forgetting to consider the limitations of his locality and the interplanting necessary for pollination purposes. The best varieties of California origin, such as the Nonpareil and I. X. L., are in a class by themselves, as is the imported Jordan.

With the exception of Jordan, Tarragona, Valencia, and at times one or two others of the better varieties, the imported nuts most sharply competing in the American markets with those produced in California are the poor varieties. There is strong competition between these and similar nuts grown in California. Grafting over most of the inferior California varieties to the better varieties would relieve some of the pressure from foreign competition.

A summary of the recommendations as to the best varieties for planting follows.[4]

Group 1.—Highest priced varieties, suited to marketing both in the shell and shelled: (1) The Nonpareil is the best variety to grow in all localities except the Oakley district. (2) The I. X. L. is sold in the shell. (See description.) Market strong. Limited to districts in which it can be grown profitably. (3) The Ne Plus Ultra brings a good price, but has several defects from the grower's standpoint. (See description.)

Group 2.—Low-priced and somewhat inferior varieties which have defects from the producer's standpoint, but for which markets have been established: (1) Drake. (2) Peerless.

Group 3.—Low-priced varieties producing heavily, but the future of which depends upon the possibility of marketing them shelled: (1) Texas. (2) Stuart. (3) Acampo Texas.

Group 4.—Varieties of use or promise under special conditions, but which as yet should be planted cautiously (see descriptions): (1) Ballard. (2) Batham. (3) Eureka. (4) Long I. X. L. (5) Smith.

Group 5.—Varieties possessing excellent qualities from the consumer's standpoint, but which can not now be grown profitably in the United States: (1) Jordan. (2) Klondike. (3) Princess.

Group 6.—Varieties which should be eliminated from commercial plantings for reasons given in the varietal descriptions of each: All those not mentioned in Groups 1 to 5.

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[4] For the reasons for these recommendations, see the varietal descriptions.

EXPLANATION OF TERMS

Acuminate. Tapering gradually to a slender, very sharp point. Used in this bulletin with reference to leaves, nuts, buds, and lenticels. See apex of the larger Drake leaf (Pl. XXII, *A*) and apexes of Nonpareil lenticels (Pl. XVII, *D*).

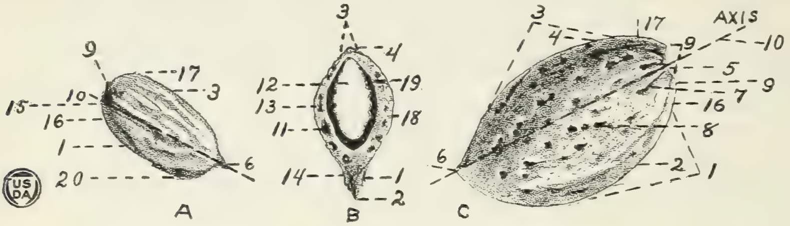

FIG. 5.—Names of the parts used in describing almond nuts: *A*, Kernel; *B*, cross section of nut; *C*, nut showing outer surface of shell. 1. Central edge; 2, wing; 3, dorsal edge; 4, dorsal ridge; 5, stem scar; 6, apex; 7, grooves; 8, pits; 9, base; 10, axis; 11, canals; 12, kernel; 13, pellicle; 14, flange; 15, base scar; 16, ventral shoulder; 17, dorsal shoulder; 18, outer shell; 19, inner shell; 20, pellicle fold

Acute. Ending in a sharp point. Used in reference to leaves, nuts, buds, and lenticels. See apex of Long I. X. L. leaves (Pl. XXV, *A*) and apexes of Malaguena Jordan lenticels (Pl. XVI, *C*). Widely acute, broadly acute, or bluntly acute. See apex of Hudson leaf (Pl. XXIII, *A*) and apexes of Tarragona lenticels (Pl. XVII, *E*).

Acute angled. Having acute angles. Used in referring to the angles which branches make with each other where they join.

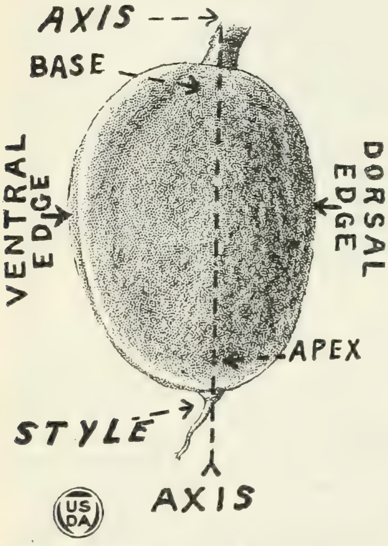

FIG. 6.—Reams almond in hull before dehiscence, showing axis, ventral edge, dorsal edge, style, base, and apex

Apex. The tip or end. Used to indicate the end of the nut, leaf, or bud opposite the end attached to the stem, and also the ends of lenticels. (Fig. 5 (*6*), fig. 6, and fig. 7, *c*.)

Appressed. Flattened against or pressed against another body. Used in reference to buds pressed against twigs or spurs.

Axis. A straight line through the center of the nut, extending from the center of the stem scar to the point of the apex. Used with reference to the nut while in the hull on the tree, the nut when hulled, and the kernel. When used with reference to the kernel, the line passes from the center of the base scar to the apex. (Fig. 5 (*10*) and fig. 6.)

Base. The attached end. Used in reference to nut, bud, leaf blade, and petiole. (Fig. 5 (*9*), fig. 6, and fig. 7, *a*.)

Base scar. The scar on the rounded end of the kernel. (Fig. 5 (*15*).)

Blade. The flat or expanded portion of the leaf. (Fig. 7, *a*.)

Bloom. A fine powder or waxy dust which sometimes whitens leaves or twigs.

Branching angle. The angle at which branches join. (See Acute and Obtuse.)

Bristle. The projecting ends of the veins in the depressions of the serrations or crenations of the leaves.

Canals. The passages running between the outer and inner surfaces of the shell, connected in many instances with the pits on the outside. (Fig. 5 (*11*).)

Cavity. The depression in the hull around the disk.

Compressed. Flattened on the sides laterally. Used with reference to nuts and buds.

Cordate. Heart-shaped. Applied to leaves, also to nuts when the part on the ventral side of axis is shaped like half a heart. (Pl. V, *D*.)

Crenate. Having the margin cut into rounded projections or scallops. (Fig. 8, *A*.)

Cuneate. Wedge-shaped. See apex I. X. L. leaf (Pl. XX, *B*).

Cuneiform. Wedge-shaped.

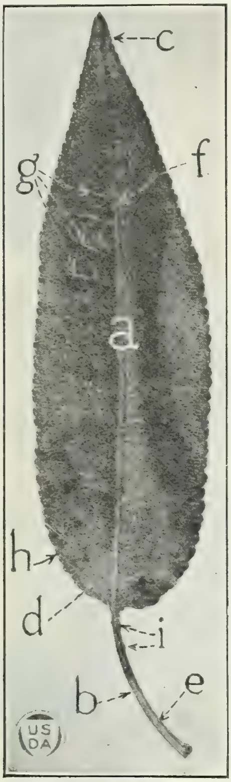

FIG. 7.—An almond leaf, with the different parts used in the classification: *a*, Blade; *b*, petiole; *c*, apex; *d*, base of blade; *e*, groove; *f*, midrib; *g*, veins; *h*, margin; *i*, glands

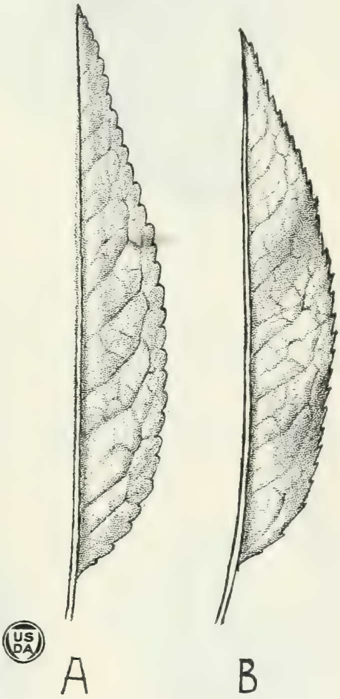

FIG. 8.—Almond-leaf margins; *A*, Crenate; *B*, serrate

Dehiscence. The opening of the hull. (Figs. 6 and 9 to 14.)

Depressed. Flattened or indented.

Disk. The expanded portion of the spur where it articulates with the stem of the nut.

Distinguishing characteristics. See Distinguishing features.

Distinguishing features. Used here to indicate characteristics most useful in comparing one variety with another for identification purposes.

Dorsal. Pertaining to the back. That part opposite the ventral portion. Applied to the edge of the nut, hull, or kernel opposite the winged edge. (Fig. 5 (*3*, *4*) and fig. 6.)

Dorsally oblique, or dorsally sloping. Sloping toward the dorsal edge. (See base of nuts in Pl. V, *D*.)

Doubles. Almond nuts in which two kernels of irregular shape are present instead of a single one.

Edgewise view. The view of the nut obtained when the dorsal or ventral edge is toward the observer.

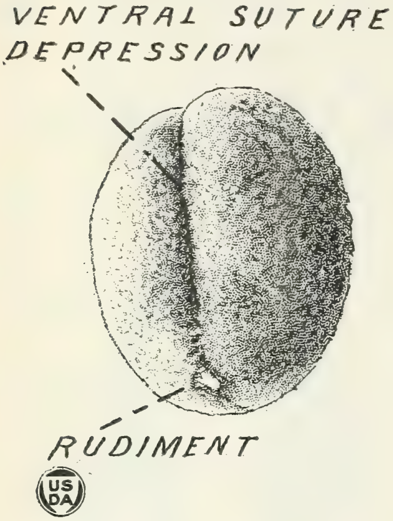

Fig. 9.—A Drake almond in its hull before dehiscence, showing the ventral suture, depression, and rudiment

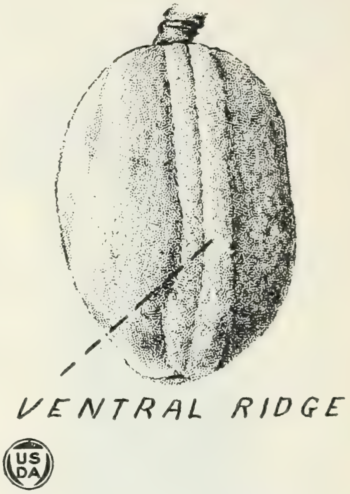

Fig. 10.—A Languedoc almond before dehiscence, showing the ventral ridge

Elliptical. Having the form of an ellipse, i. e., oblong with rounded ends. (See blade of middle leaf of King, Pl. XXV, *B*.) Applied to lenticels when both ends have the same curve, even though they are acute. (See lenticels, Pl. XVII, *A*.)

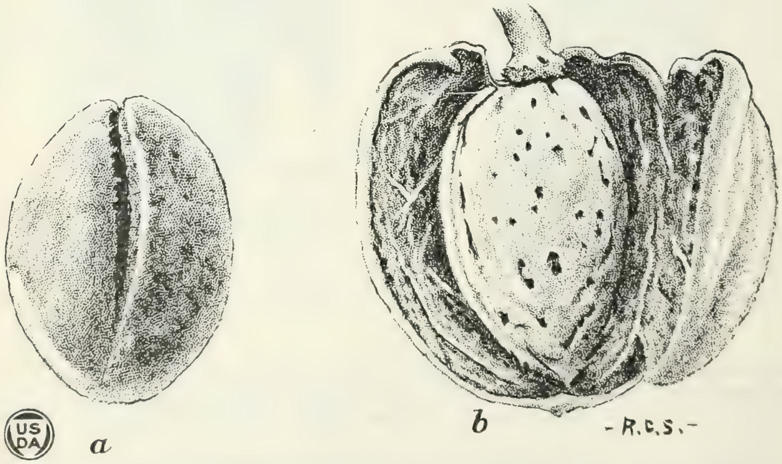

Fig. 11.—A Peerless almond dehiscing, the type opening on the ventral edge only: *a*, Dehiscence starting; *b*, dehiscence complete

Epidermis. Used here to apply to the outer layers of bark.

Exfoliate. To come off in thin scales, flakes, or pieces; applied to the bark.

Exfoliations. Pieces of bark peeling off.

Fibers. Applied to fibers occurring between the outer and inner shell of the almond nut. The fibers run through canals. (Fig. 5 (*11*).)

Flange. The projecting portion of the wing and shell along the ventral edge of the nut. (Fig. 5 (*14*).)

Flatwise view. In all descriptions of the nut and kernel the view when the side is toward the observer is the one referred to unless otherwise stated. (Fig. 5, *A* and *C*.)

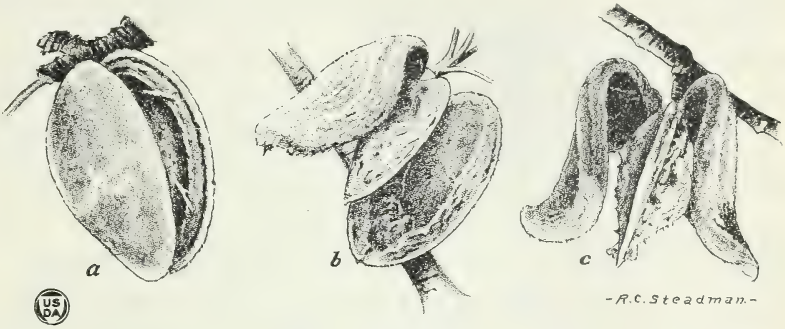

Fig. 12.—An I. X. L. almond dehiscing, the type in which the hull opens on both the ventral and the dorsal edges: *a*, Dehiscence beginning; *b*, dehiscence nearly complete; *c*, dehiscence complete

Foliage. The mass of leaves.

Free. Applied to buds when they stand out well from the spur or twig.

Glands. The small globular, oval, or reniform bodies occurring on the petiole or base of the leaf blade. (Fig. 7, *i*.)

Glaucous. Overcast with a light-colored bloom.

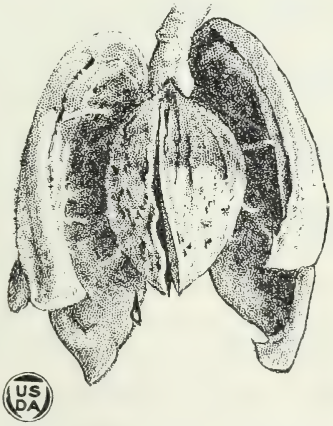

Fig. 13.—Dehiscence of a California almond. The type of dehiscing is similar to that shown in Figure 12, except that the apex of each half of the hull divides

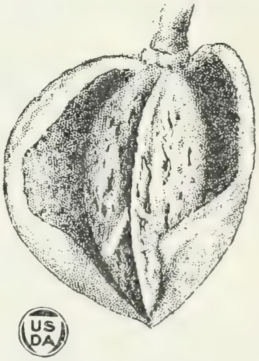

Fig. 14.—Charactertistic dehiscence of the Nonpareil almond

Groove. The long, narrow depression along the upper surface of the petiole, also long depressions on the surface of nuts or hulls. (Fig. 7, *e*, and 5 (*7*).)

Head. The top of the tree, exclusive of the trunk.

Hull. The outer leathery covering or husk of the almond nut, which is separated from the shell of the nut when ripe. (Figs. 6, 9 to 14.)

Hulled nuts. Applied to the almond in the shell after the hull has been removed. (Fig. 5, *C*.)

Inner shell. The portion of the shell between the canals and the kernel. The inner shell usually differs in texture from the outer shell. (Fig. 5 (*19*).)

Internodes. The portion of a stem between two nodes.

Kernel. The edible portion of the nut. In the description the term "kernel" includes the pellicle. (Fig. 5, *A*.)

Lateral. On the side of. Applied to side branches springing from main branches.

Length of dorsal and ventral edges. The distance along the dorsal or ventral edge from the stem scar to the extreme apex in the nut and from the base scar to the apex in the kernel.

Lenticels. Small openings in the bark. Pores in the cortex, accompanied by an accumulation of corky material, through which air penetrates to the interior of woody plants. The lenticels have characteristic shapes, sizes, colors, elevations, etc., which are important in comparing varieties, especially when the comparison is made on the same age of bark on trees under similar climatic and growing influences. (Pls. XVI and XVII.)

Midrib. The central vein of a leaf blade, being a continuation of the main vascular bundle through the petiole. (Fig. 7, *f*.)

Nodes. The places on the stem where the leaves are borne.

Obovate. Inversely ovate. (See the lower middle leaf near the letter A in Pl. XVIII.)

Obtuse. Used here to mean blunt or rounded. Should not be confused with obtuse angle. (See base of leaves in Pls. XXI, *A*, XXIII, *A*, and XXV, *A*.)

Oval. Used here to mean broadly elliptical. (See second leaf from right side in Pl. XVIII.)

Ovate. Egg-shaped, with the broader end basal. Used with reference to leaves, nuts, buds, etc., to describe their outline when drawn on a flat surface; i. e., the term ovate applies to surface view only. The corresponding term for solids is "ovoid." (See I. X. L. leaves, Pl. XX, *B*.)

Ovoid. Egg-shaped, with the large end toward point of attachment.

Outer shell. The portion of the shell outside the main canals. (Fig. 5 (*18*).)

Paper shell. Applied to almonds with an exceedingly thin shell, as in the California or Nonpareil varieties.

Pellicle. The thin skin or membrane covering the kernel. (Fig. 5 (*13*).)

Pellicle fold. A fold of the pellicle occurring along the ventral edge of the kernel near the apex. (Fig. 5 (*20*).)

Petiole. The stalk or stem of a leaf. (Fig. 7, *b*.)

Pits. The round or irregular depressions on the surface of the shell. (Fig. 5 (*8*).)

Prominence. Used here to express the extent to which one particular part extends outward from another. In describing the wing, for instance, "prominent" takes the place of the usual term "wide," because width is used in this connection to mean thickness only.

Pubescence. The hairs on the hull or hairlike glands on the pellicle.

Raised. Applied to the lenticels when they project above the outer surface of the bark.

Recurved. Curved backward, or opposite the usual direction.

Reniform. Kidney-shaped.

Ridge. A long elevation. Used here especially in referring to the ridged portion frequently present on the dorsal edge of the almond nut or on the ventral edge of some hulls before dehiscence. (Fig. 10.)

Scimitar shaped. Applied to a peculiar recurved appearance of the apex of some almond nuts.

Serrate. Notched or toothed like a saw, with the teeth pointed toward the apex. (Fig. 8, *B*.)

Serration. One of the teeth in a serrate margin. (Fig. 8, *B*.)

Shoulder. The portion of the ventral and dorsal edges forming the base of the nut or kernel. (Designated as "ventral shoulder" and "dorsal shoulder." (Fig. 5 (*16*, *17*).)

Spur. An exceedingly short branch upon which fruit is borne. (Fig. 10.)

Stem scar. The scar on the base end of the nut at the point where it was attached to the spur. (Fig. 5 (*5*).)

Striations. Wavy or crooked streaks of different color from the rest of the bark, running longitudinally and parallel to the branch, frequently caused by the cracking of the epidermis of the bark. Striations are characteristic of some varieties.

Sticktights. Almonds in which the hull opens only partially and sticks to the nut when ripe.

Stippled. Having very small, shallow, round, dotlike depressions and small bumps occurring on the shell of the nut between the pits, giving the surface a rough appearance. (Characteristic of some varieties.)

Stipules. Used here to mean small appendages of the leaf borne on the petiole or sometimes on the base of the blade.

Stocky. Large in diameter in proportion to length.

Suture. The line or seam of union of two adjacent parts grown together. (Figs. 9 and 10.) Used with reference to the shell and hull.

Suture crease. A longitudinal depression or groove having the suture along its bottom. (Fig. 9.)

Suture depression. A longitudinal depression or groove having the suture at its bottom. (Fig. 9.)

Suture line. The line visible on the surface formed by the union of two adjacent parts. Used with reference to the nut and hull. In reference to the hull the term "suture line" is used before dehiscence starts and "suture" is used after dehiscence begins.

Symmetrical. With halves equal. When the sides of the nut curve equally they are said to be symmetrical, and when they curve unequally they are said to be unsymmetrical. With reference to the leaves, the term "symmetrical" is used when the margins at the base of the blade join the petiole at opposite points, making the halves of the blade on each side of the midrib equal. (See base of leaf blade in Pl. XXVI, *A*.) When the margins do not join the petiole at opposite points the term "unsymmetrical" is used. (See base of middle leaves in Pls. XXI and XXIII and base of leaves to the left of the letters *A* and *B* in Pl. XXII.)

Tapering. Narrowing regularly to a point. Wedged-shaped. (See apexes of leaves in Pl. XX, *B*.)

Truncate. Having the end square as if cut off. (See apex of the three leaves on left side of Pl. XVIII and base and apex of nut in Pl. I, *A*.)

Trunk. The main stem of the tree between the branching portion and the roots.

Twigs. Here applied to the small branches of the current season's growth.

Unsymmetrical. Not symmetrical. See Symmetrical.

Undulating. Wavy.

Veins. Small vascular bundles forming part of the framework of a leaf. Veins differ in the almond as to arrangement, elevation, and manner of branching. (Fig. 7, *g*.)

Ventral edge. The flanged or winged edge of the nut. Also applied to the edge of the kernel or hull nearest the winged edge of the shell. (Fig. 5 (*1*).)

Ventral streak. The yellowish or brownish streak or patch on the inside of the shell on the ventral edge.

Ventrally oblique. Sloping ventrally.

Wide angled. Applied here to angles over 45°.

Wing. The thin or narrow portion of the shell projecting from the ventral edge of the nut. (Fig. 5 (*2*).)

KEY TO ALMOND VARIETIES BASED UPON THE CHARACTERISTICS OF THE NUT

It is hoped that the following key, based on the characteristics of the nut, will be found helpful in the identification of almond varieties. When a variety has been traced in the key to a particular number, the complete description of the variety so numbered should be read carefully, and the illustrations of the variety should be consulted. In order to make the key as simple as possible, the divisions include only a few characteristics of the nut and only those which have been found to be quite constant. Other characteristics which distinguish the varieties are given under the descriptions. Therefore, when a variety is traced down in the key and is found to correspond with the description in all respects it may be concluded with reasonable certainty that the variety has been identified. Where very close resemblance exists among several varieties, attention is called to the fact in the descriptions.

Allowance is made for a certain degree of variation, but satisfactory results should not be expected from the use of a few "off-shaped" nuts such as occur occasionally in all varieties, nor should results be expected to a certainty from the examination of only a few specimens. Best results will be secured when a number of average nuts are taken from a fairly large sample, at least a pound. Whenever measurements and ratios are given, the eye should not be trusted, but the measurements should be actually made.

In tracing down a variety it is not absolutely necessary to begin with the first characteristics given in the key. For example, the first division of the key, that of the slope of the base scar with reference to the axis, may be skipped and the prominence of the wing used as a starting point instead. This arrangement is useful when one is in doubt regarding a point in the series. On the other hand, the farther down the key one begins the more comparisons he will have to make. Only the standard recognized varieties are given in this key. When a sample of nuts can not be traced in the key to any variety and is not found to agree with any of the descriptions, it may be classed with safety as a sample from a seedling tree which has not been named or propagated commercially.

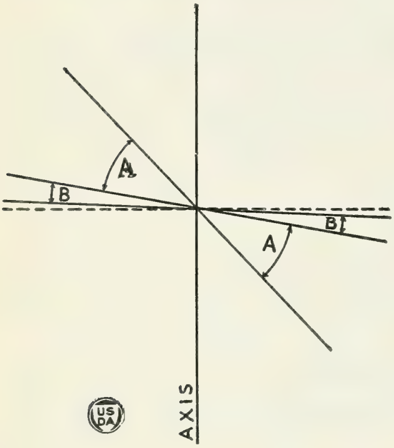

FIG. 15.—Diagram for use in determining whether the base scar is described as sharply sloping or gently sloping: "Sharply sloping" if the slope falls within angle "A"; "gently sloping" if the slope comes within angle "B." The dotted line is at right angles to the axis

A brief explanation of the divisions of the key and the terms used are here given. For other definitions, see "Explanation of terms."

The first divisions in the key are based on the various ways in which the stem scar slopes with relation to the longitudinal axis of the nut. The following six divisions are made:

A. Stem scar sharply dorsally sloping with reference to the axis (fig. 15); whole base also slopes dorsally.

B. Stem scar slightly but distinctly dorsally sloping. (See diagram, fig. 15.)

C. Stem scar at right angles to axis or slightly dorsally sloping when both of these types are found in the same variety.

D. Stem scar at right angles to the axis or slightly ventrally sloping when both types are found in the same variety. Usually the majority of the nuts in a sample of this class have the stem scar at right angles to the axis.

E. Stem scar at right angles to the axis or sloping slightly either ventrally or dorsally when all three types are found in the same variety. In this case a considerable percentage of the nuts will have the stem scar at right angles to the axis, while the number of nuts with the stem scar sloping dorsally or ventrally will vary.

F. Stem scar ventrally sloping when all the nuts in a variety have stem scars sloping ventrally with reference to the axis. The number of varieties belonging to this class is small.

Each of the above classes is divided into five subclasses based upon the prominence of the wing, or flanges, and easily recognized by actual measurement, as follows:

I. Wing very prominent when some portion of the wing projects a distance equal to one-seventh the total width of the nut or greater.
II. Wing medium in prominence when the wing projects a distance of less than one-seventh and more than one-tenth the width of the nut.
III. Wing not prominent when the wing projects a distance of less than one-twelfth the width of the nut.
IV. Wing not prominent to medium prominent when the wing varies in the variety so that some nuts come under II and some under III.
V. Wing medium to prominent when the wing varies in the variety so that some nuts come under I and some under II.

These subclasses are each grouped into three divisions based upon the ratio of the width to the length of the nut, by measurement as follows:

1. Very long nuts, averaging 1.8 as long as wide or longer.
2. Very short nuts, averaging 1.25 as long as wide or shorter.
3. Nuts of medium length, averaging less than 1.8 as long as wide and greater than 1.25 as long as wide.

Each of these groups is divided into the following subdivisions, based upon the ratio of the thickness to the width of the nut:

(1) Nuts very thin; thickness averaging five-eighths the width or thinner.
(2) Nuts very plump; thickness averaging five-sixths the width of the nut or thicker.
(3) Nuts medium in thickness; thickness greater than five-eighths the width of nut and less than five-sixths the width of the nut.

Each of these subdivisions is divided into two further divisions, based upon the character of the ventral edge:

a. Ventral edge ridged. It should be noticed that the term " ridge " here does not refer to the wing, or flange, but to a marked longitudinal ridge or corrugation at some distance from the wing and parallel to it, accompanied by a wide longitudinal depression between the ridge and the wing. Such ridges and accompanying depressions may occur on one or both sides of the ventral edge.
b. Ventral edge smooth. When no marked ridges or ventral depressions as described in *a* occur.

The next divisions are based upon some of the characteristics of the kernels as they appear about two months after the nuts are harvested, although sufficient latitude is allowed so that the characteristics apply to any kernel.

A kernel is (*a*) thin when the thickness is one-half the width or less; (*b*) plump when it is two-thirds or more as thick as wide; (*c*) medium when the thickness is greater than half the width and less than two-thirds the width.

The dorsal shoulder of a kernel may be square and humped or gently curving and sloping.

The kernel is said to be pubescent when the pubescence on the pellicle is heavy and abundant; it is smooth when the pubescence is very slight or occurs at apex only. This characteristic is very constant.

Note.—Recent improvements in cracking machinery will result in slightly higher percentages of kernel in machine-cracked nuts than those given in this bulletin.

KEY

[The numbers in parentheses at right refer to the varietal descriptions which follow.]

- A. Stem scar sharply dorsally sloping.
    - I. Wing very prominent.
        - 2. Very short nuts.
            - (3) Nuts medium in plumpness.
                - *a.* Ventral edge of nut ridged.
                    - (*a*) Kernel thin to medium and rather smooth (27).
                    - (*b*) Kernel plump and very pubescent (71).
                - *b.* Ventral edge of nut smooth (75).
        - 3. Nuts medium in length.
            - (3) Nuts medium in plumpness.
                - *b.* Ventral edge of nut smooth.
                    - (*a*) Dorsal shoulder of kernel square and humped.
                        - § Kernel very pubescent and medium in plumpness (8).
                        - §§ Kernel plump.
                            - * Pubescence on kernel medium, kernel rather dark in color, apex of kernel slightly tapering (41).
                            - ** Kernel smooth, rather light in color (57).
    - II. Wing medium in prominence.
        - 2. Nuts very short, very plump, very small (56).
        - 3. Nuts medium in length.
            - (3) Nuts medium in thickness.
                - *a.* Ventral edge of nut ridged (99).
                - *b.* Ventral edge of nut smooth.
                    - (*a*) Kernel thin, dorsal shoulder humped (33).
                    - (*b*) Kernel plump, dorsal shoulder square, much sloping, often dished (67).
    - III. Wing not prominent.
        - 2. Nut corrugated like peach pit (142).
        - 3. Nut smooth (18).
    - IV. Wing not prominent to medium prominent, nut medium long, medium plump, kernel plump (26).
    - V. Wing medium to prominent.
        - 2. Nuts very short, medium plump; kernel plump and very pubescent (29).
        - 3. Nuts medium in length.
            - (3) Nuts medium in plumpness.
                - *b.* Ventral edge of nut smooth.
                    - (*a*) Kernel thin.
                        - § Kernel smooth and large; outer shell quite crumbly, rough and porous (70).
                        - §§ Kernel with medium amount of pubescence, nut and kernel rather small, shell smooth, hard, rather flinty (74).
- B. Stem scar gently dorsally sloping.
    - I. Wing very prominent.
        - 2. Nuts very short, ventral edge ridged, and grooved longitudinally, kernel pubescent (5).
        - 3. Nuts medium in length.
            - (1) Nuts thin.
                - *a.* Ventral edge ridged (60).
                - *b.* Ventral edge smooth, kernel thin (122).
            - (3) Nuts medium in thickness.
                - *a.* Ventral edge ridged (77).
                - *b.* Ventral edge smooth.
                    - (*b*) Kernel plump.
                        - § Kernel with dorsal shoulder humped and square.
                            - * Nut large (32).
                            - ** Nut quite small (42).
                        - §§ Kernel with dorsal shoulder round, not square and humped (46).
    - II. Wing medium in prominence.
        - 3. Nuts medium in length.
            - (2) Nuts very plump.
                - *b.* Ventral edge smooth.
                    - (*b*) Kernel plump.
                        - § Kernel very pubescent (63).
                        - §§ Kernel medium in pubescence.
                            - * Nut medium in size (2).
                            - ** Nut exceedingly small (147).
            - (3) Nut medium in plumpness.
                - *a.* Ventral edge ridged.
                    - (*b*) Kernel plump (16).
                    - (*c*) Kernel medium plump with square humped dorsal shoulder and very pubescent (53).
                - *b.* Ventral edge smooth.
                    - (*a*) Kernel with square, humped, dorsal shoulder.
                        - § Kernel plump, seldom double, and shell having a decidedly pink ventral edge (3).
                        - §§ Mostly with double kernels; when single, kernels medium in plumpness (55).
    - III. Wing not prominent.
        - 3. Length of nut medium.
            - (3) Thickness of nut usually medium.
                - *b.* Ventral edge of nut smooth.
                    - (*a*) Kernel decidedly thin and flat, nut very large (1).
                    - (*b*) Kernel plump, rather short, and quite smooth, i. e., only slightly pubescent (19).
                    - (*c*) Kernel medium plump, very pubescent, with apex very blunt, nut medium in size (86).

- B. Stem scar gently dorsally sloping—Continued.
  - V. Wing medium in prominence to prominent.
    - 3. Length of nut medium.
      - (3) Width of nut medium.
        - *b*. Ventral edge of nut smooth.
          - (*a*) Kernel thin, shoulder usually square and humped (68).
          - (*b*) Kernel plump, shoulder not square or humped (4).
- C. Stem scar at right angles to axis or slightly dorsally sloping.
  - I. Wing very prominent.
    - 1. Very long nuts, medium in plumpness, with plump kernels and soft shell (13).
    - 2. Very short nuts, medium in plumpness, and hard shell (64).
    - 3. Nuts medium in length, medium in plumpness, with medium to plump kernels having a sweet flavor (47).
  - II. Wing medium in prominence.
    - 1. Very long nuts, medium in thickness, ventral edge ridged, kernel thin and pubescent, outer surface of shell smooth and light in color (39).
    - 2. Short nuts.
      - (3) Nuts medium in thickness.
        - *a*. Ventral edge grooved and bulging in middle, outer surface of shell dark in color (89).
        - *b*. Ventral edge smooth, outer shell very light in color (140).
  - III. Wing not prominent.
    - 1. Nuts long.
      - (3) Medium in thickness.
        - *b*. Ventral edge smooth.
          - (*b*) Kernel plump (9).
    - 3. Nuts medium in length.
      - (3) Nuts medium in thickness.
        - *a*. Ventral edge grooved.
          - (*a*) Kernel thin and pubescent (59).
  - V. Wing medium in prominence to prominent.
    - 2. Short nuts, medium in plumpness, ventral edge usually grooved, kernel plump and with slight but distinct bitter flavor (72).
    - 3. Nuts medium in length.
      - (3) Nuts medium in thickness.
        - *a*. Ventral edge of nut grooved (73).
        - *b*. Ventral edge of nut smooth (35).
- D. Stem scar at right angles to axis or slightly ventrally sloping.
  - I. Wing prominent.
    - 1. Nuts very long.
      - (1) Nuts thin, kernels somewhat irregular in shape (20).
      - (3) Nuts medium in plumpness, kernel thin, regular in shape (50).
    - 3. Nuts medium in length.
      - (1) Nuts thin, kernel thin, dorsal shoulder not humped, pellicle very smooth (52).
      - (3) Nuts medium in thickness.
        - (*a*) Kernels thin.
          - § Dorsal shoulder very distinctly humped (38).
          - §§ Dorsal shoulder rounding, very seldom humped (48).
  - II. Wing medium in prominence.
    - 1. Nuts very long.
      - (3) Nuts medium in thickness.
        - *a*. Ventral edge grooved.
          - (*b*) Kernel plump (28).
    - 3. Nuts medium in length.
      - (3) Nuts medium in thickness.
        - *a*. Ventral edge grooved (36).
        - *b*. Ventral edge smooth.
          - § Shell quite dark, spongy, and somewhat crumbly (6).
          - §§ Outer surface of shell light in color and hard (23).
  - IV. Wing not prominent to medium prominent.
    - 1. Nuts long, medium in thickness, ventral edge grooved, kernels plump (40).
    - 3. Nuts medium in length, medium in thickness, ventral edge smooth, kernels flat (54).
  - V. Wing medium in prominence to prominent, nut medium in length and thickness, kernels with distinctly bitter tinge (43).
- E. Stem scar at right angles to the axis or slightly sloping either ventrally or dorsally.
  - I. Wing very prominent.
    - 1. Nuts very long.
      - (1) Nuts thin, kernels thin (76).
      - (3) Nuts medium plump.
        - *a*. Ventral edge of nut grooved, kernels plump (34).
        - *b*. Ventral edge of nut smooth, kernels medium in plumpness (10).
    - 3. Nuts medium in length.
      - (1) Nuts thin (17).
      - (3) Nuts medium in thickness.
        - *a*. Ventral edge of nut grooved.
          - (*a*) Kernels thin (49).
          - (*b*) Kernels plump.
            - * Dorsal shoulder of kernel square and humped (146).
            - ** Dorsal shoulder of kernel usually round, not square and humped (44).
        - *b*. Ventral edge of nut smooth, kernels thin (58).
  - II. Wing medium in prominence.
    - 1. Nuts very long.
      - (2) Nuts very plump, rather small, shell soft and crumbly (22).
      - (3) Nuts medium in plumpness.
        - (*a*) Outer shell porous, soft, pits exceedingly large (66).
        - (*b*) Outer shell hard and flinty, pits medium in size (25).

E. Stem scar at right angles to the axis or slightly sloping either ventrally or dorsally—Continued.
II. Wing medium in prominence—Continued.
3. Nuts medium in length.
(3) Nuts medium in plumpness.
a. Ventral edge of nuts grooved, kernel thin and large (11).
b. Ventral edge smooth.
(*b*) Kernel plump, apex of nut tapering and ending in a very long, recurved, pointed wing. (This variety is found only very occasionally (62).)
(*c*) Kernel medium in plumpness.
§ Base of kernel usually truncate, dorsal shoulder square (24).
§§ Base of kernel round, not truncate, and dorsal shoulder curved, not square.
* Many double kernels (7).
** Few double kernels.
† Kernels large, very pubescent, pits in shell very numerous and irregular, base of nut with numerous fine short grooves, extreme apex of nut when viewed dorsally thick and slightly truncate without the wing showing (14).
†† Kernels only moderately pubescent, pits moderately numerous, base of nut without numerous short grooves, point of wing showing at apex.
‡ Surface of shell between pits usually smooth, shell dark in color. Kernel rather long, and apex of kernel not distinctly cuneiform (65).
‡‡ Surface of shell between pits usually stippled. Shell medium brown in color, kernel moderately short with apex distinctly cuneiform (30).
III. Wing not prominent.
3. Nuts medium in length.
(3) Nuts medium in width.
a. Nuts ridged on ventral edge, kernel thin (37).
b. Nuts smooth on ventral edge.
(*a*) Kernels thin (138).
(*b*) Kernels plump or at least medium in plumpness.
§ Dorsal shoulder square and humped (51).
§§ Dorsal shoulder round and sloping, not square and humped (12).
V. Wing medium in prominence to prominent.
3. Nuts medium in length.
(3) Nuts medium in thickness.
a. Nuts with ventral edge ridged (61).
b. Nuts with ventral edge smooth (69).
F. Stem scar sloping ventrally.
I. Wing very prominent.
1. Nuts very long.
(3) Nuts medium in plumpness, kernel only lightly pubescent (45).
3. Nuts medium in length.
(2) Nuts plump, kernel very pubescent (21).
II. Wing medium in prominence.
1. Nuts long.
(2) Nuts plump.
a. Ventral edge of nut ridged.
§§ Kernel plump (15).
3. Nuts medium in length.
(3) Nuts medium in thickness.
b. Nuts with ventral edge smooth.
§ Kernel thin (31).

COMMERCIAL ALMONDS GROWN IN THE UNITED STATES

1. ALMENDRO DE LA P.

Origin.—Introduced in 1912, from Granada, Spain, through Peter Giraud, by Walter T. Swingle, of the United States Department of Agriculture. Distributed from the United States Plant Introduction Garden at Chico to a few places in California.

Description

TREE

Upright (ratio of width of head to height, 1:1.2). Quite vigorous. Trunk stocky; bark moderately rough, exfoliates in thin small patches.

Main branches.—Upright, rather stocky, quite long. Branching angle acute. Wood with many knots. Bark cinnamon brown, often striated on young branches; exfoliates in thin flakes.

Twigs.—Medium in length, moderately stocky. Branching angle acute. Nodes medium to large. Internodes medium in length (½ to 1½ inches). Bark dull green, spotted with brown in autumn.

Lenticels.—Medium to numerous; very slightly raised on old wood, on level with surface of bark or slightly depressed on young wood. Size variable (on bark 8 to 10 years old 1/16 by 3/16 to 3/32 by ¾ inch), long, narrow, gray, cracked through middle, apexes acute on old bark, blunt on young bark. Very numerous on twigs.

Foliage.—Moderately dense. Leaves moderately numerous on individual branches, often borne mostly on spurs.

Blade: Variable in size, average large (1 by 4 inches; ratio of width to length, about 1:4). Shape oval, ovate, or elliptical, narrow. Base rounded, or bluntly acute; origin of margins either symmetrical or unsymmetrical, being remarkably variable in this regard. Apex usually bluntly acute, sometimes rounded. Margin on mature leaves usually longly crenate, but often serrate. Midrib pale green, medium in size. Veins elevated slightly on lower surface. Upper surface medium deep green. Lower surface lighter than upper.

Petiole: Rather short (average about ⅞ inch, ratio of length of petiole to length of blade, average 1: 4½). Medium in size. Groove medium in width; depth moderate to quite deep. Glands commonly two, often three or four, sometimes more, small to medium, round or oval, green or brownish.

Bearing habit.—On spurs on wood 2 to 4 years old. Spurs vary much in diameter and slightly in length. Buds rather large; scales thick, with much pubescence.

NUT [5]

Immature nut.—[6] Very large, one of the most striking varieties in this regard (2 to 3½ inches in diameter). Shape variable. Ventral edge smooth or creased, never with ridge.

Hull: [7] Light green, pubescent. Usually dehisces on ventral edge, seldom on both ventral and dorsal edges. Ripens last of August and early September.

Hulled nut.[8]—(Pl. I, *A*.) Large (2¼ by 1¾ by ⅞ to 2¼ by 1½ by 1 inches). Number of hulled nuts to the pound averages 25. Kernel 11 to 16 per cent by weight of hulled nut.

Shape: Either flat or plump; inclined to be rectangular. Ventral edge thick; flanged most near apex, seldom winged; ventral edge depressed at base; ventral suture indistinct. Dorsal edge with broad ridge most prominent at base and apex. Base truncate; stem scar large, oval, slightly dorsally sloping; dorsal shoulder straight, ventral shoulder sharply curved. Apex blunt, round, or truncate, usually with small mucronate point.

Shell: Very thick (nearly ¼ inch) and hard. Outer surface yellowish brown. Pits deep and irregular in shape. Numerous shallow grooves at base and down sides. Canals large. Inner shell thick. Inner surface smooth and yellowish brown. Ventral streak light brown, narrow, medium length, with bluntly tapering base.

Kernel: Large (1 by ⅝ by ¼ inch); thin, flat, wide for length. Ventral shoulder more rounded than dorsal shoulder and usually sloping. Ventral and dorsal edges gradually curved. Apex obtuse. Pellicle brown, very pubescent, thick, tough, veins distinct. Flavor good, pleasantly sweet.

Distinguishing characteristics.[9]—Easily distinguished from other varieties by its large size. Shape quite flat, rectangular; base truncate; apex truncate or very bluntly rounded; shell very thick; kernel thin, flat, cuneiform, pubescent, large, but small for size of nut.

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[5] The term nut is here used to include the fruit of the almond, the pericarp and its contents.

[6] The descriptions of the immature nut throughout this bulletin were made after the nut had reached full size, just before any sign of dehiscence of the exocarp appeared and while the nut was still green on the tree.

[7] The term hull is here used instead of the more technical term exocarp. The hull, or exocarp, of the almond corresponds to the flesh of the peach. The descriptions of the hull were made during the period of dehiscence.

[8] The term hulled nut is used for the ripened kernel with its inclosing endocarp in distinction from the immature nut (footnotes 5 and 6). It is the unshelled almond of the trade, the shell being technically the endocarp. The endocarp and exocarp together make up the pericarp, in which the kernel, or " meat," is inclosed.

[9] The distinguishing characteristics are not usually intended to be sufficiently comprehensive to distinguish any variety of nut from all others, but only to aid in comparing it with those varieties with which it is most apt to be associated in the market or which it resembles. When several varieties resemble one another remarkably closely special mention is made of the distinguishing points.

COMMENTS

Ripens early in the fall. Although the flavor of the kernel is excellent, the very hard shell and small percentage of kernel are sufficient to exclude the nut from favor. A few trees are found in various orchards in the Sacramento and San Joaquin Valleys of California, but the variety is not extensively grown at the present time and has no value as a commercial almond.

2. BALLARD (BALLARD DRAKE; BALLARD'S SEEDLING)

Origin.—In 1897 L. A. Ballard, of Pennington, Calif., discovered in the Marysville Buttes a chance seedling tree which he considered promising. From this tree buds were taken and budded on other almond trees in Mr. Ballard's orchard. The variety was later gradually distributed in the Pennington district. There are about 100 acres of this variety in the Live Oak–Pennington district at present (1923).

Description

TREE

Upright tendency with branches somewhat spreading (ratio of height of head to width, 1:1). Moderately vigorous grower. Trunk medium stocky; bark rough, exfoliates in large patches.

Main branches.—Tend to grow upright, rather stocky, medium in length. Branching angle acute. Tree branches profusely. Wood brittle. Bark dark yellowish brown with considerable gray epidermis, striated on young branches, rough on old branches; exfoliates in small flakes.

Twigs.—Stocky; usually make good growth. Internodes short (average ½ inch). Wood brittle. Bark rather tough, thick, green, with much red color in autumn.

Lenticels.—Vary in number, few to numerous, usually few on growth 3 to 6 years old, elliptical with acute or acuminate ends, large (average size on bark 6 to 8 years old, 3/32 by ⅝ inch; on 5-year-old wood, 1/32 by ⅝ inch, raised, ash gray; old lenticels tend to have sides near middle quite straight with acuminate ends at extreme apexes. On young branches, lenticels small, wide, raised, with sides sharply curving. On twigs, lenticels numerous and conspicuous.

Foliage.—Dense. Leaves numerous, flat, or gently rolled along midrib, frequently slightly recurved.

Blade: Varies in size from small to quite large (¾ by 2 inches to ⅞ by 3⅓ inches): average medium (¾ by 2¾ inches). Ratio of width to length, about 2:7. Shape ovate or elliptical-ovate. Base tends to be quite acute; origin of sides slightly unsymmetrical. Apex usually tapering, acute. Margins frequently uneven in outline; crenate; crenations vary in depth and length. Upper surface glossy, light deep green. Lower surface dull green, much lighter in color than upper. Midrib pale, medium slender, medium prominent. Veins distinct, slightly elevated on lower surface.

Petiole: Long (average ⅞ inch, ratio of length of petiole to length of blade, about 1:3), rather slender, widens near base of blade; light green tinged with red in autumn. Groove rather narrow and deep. Stipules occasionally present near base of blade. One or two of the basal crenations nearest the petiole sometimes missing, extra large, or glandular. Glands usually two, sometimes three or four, brownish, yellow, small, globular or ovate-elliptical.

Bearing habit.—Bears well and quite regularly on spurs on wood 2 to 4 years old, mostly on wood 2 and 3 years old. Tendency to bear in clusters. Spurs medium in length (¼ inch), large in diameter (⅛ inch). Disk wide oval (¼ by 5/16 inch). Buds large, rather plump; scales medium tough, thin, brown, with considerable gray pubescence on their edges.

NUT

Immature nut.—Medium in size (average, 1¾ by 1½ by 1⅛ inches). Ovate, i. e., ovate to ventral side of axis; obovate to dorsal side of axis. Ventral edge curves much more than dorsal, curves most at base; smooth; suture depression 1/64 inch deep and 1/16 inch wide; sometimes slight suggestion of a ridge. Dorsal edge very gently curved throughout base half, much curved at apex. Base irregular, very short grooves and ridges present, dorsally sloping; ventral shoulder elevated and round; dorsal shoulder square, projecting ⅛ to ⅜ inch from edge of disk, then dropping off suddenly; cavity, $\frac{1}{2}$ inch across and $\frac{1}{16}$ to $\frac{3}{32}$ inch deep. Apex bluntly pointed with tendency to be widely cuneiform; the rather thin dorsal edge curves in suddenly and is then straight for $\frac{1}{2}$ inch at apex; style drops early; rudiment exceedingly small.

Hull: Outer surface green, turning yellowish and finally dark brown when dehiscing, frequently having a reddish tinge; pubescence very short, medium in quantity, medium fine, felty, gray. Dehisces along ventral edge first, then from apex upward on dorsal edge, but the majority dehisce on ventral edge only. When dehiscing on both edges, the two halves of the hull remain attached at the base. During the first stage of dehiscence the inner surface of the hull is light green, changing rapidly to dark brown. Ripening dates, September 5 to 30.

Hulled nut.—(Pl. I, *B.*) Size medium (1$\frac{1}{4}$ by $\frac{3}{4}$ by $\frac{5}{8}$ inches) and fairly regular. Number of nuts to the pound average 140. Percentage of kernel to nut in hand-cracked samples, 40 to 50.

Shape: Plump, ovate; viewed edgewise, oval to cuneiform. Ventral edge with wing thin, extending throughout entire length and most prominent between middle and apex; extends close to stem scar. Ventral suture on one or both sides of wing slightly depressed near stem scar, at which point only it is distinct. Tendency for wing to form bulge at one-third of distance from apex to base. Dorsal edge with distinct dorsal ridge most prominent near apex and base ($\frac{1}{16}$ inch wide); frequently corky in structure, usually of a darker brown than the rest of the almond, and marked by fine longitudinal lines. Base dorsally sloping. Stem scar runs close to dorsal ridge, small to medium in size. Apex slightly tapering, ending in sharp point.

Shell: Outer surface rather soft, easily broken with fingers; scuffs off some. Pits, medium in number, mostly round, medium size, deep. Surface between pits stippled. Canals large, usually oval. Inner shell thin and hard; inner surface smooth. Ventral streak narrow to medium in width ($\frac{1}{32}$ to $\frac{1}{16}$ inch) and either lighter or darker in color than rest of shell.

Kernel: Some doubles; size medium to rather large (average, 1 by $\frac{1}{2}$ by $\frac{3}{8}$ inch). Plump. Ovoid to cuneiform. Both dorsal and ventral edges slightly curving toward apex. Ventral shoulder slightly rounded. Dorsal shoulder oblique and usually straight. Pellicle thick, tough, pubescent, usually dark brown in color. Flavor fair.

Distinguishing characteristics.—Nut resembles Drake quite closely, but apex is more tapering and ends in a sharp point, the shell is lighter in color, and the kernel more pubescent. In the Ballard there is a tendency for the wing to bulge near the apex. The nut is remarkably like the Spagon and Pistache in shape, but the latter two are exceedingly small and, therefore, easily recognized. The Ballard can be distinguished from other varieties by the same points as those by which the Drake is distinguished.

COMMENTS

The blossoms of this variety usually escape frost injury because of its late-blooming habit. It normally blooms about the same time as the Drake. The nuts ripen during September. The tree is a heavy and regular bearer and may prove of value for interplanting with the Hatch varieties for pollination purposes. The variety should not, however, be widely planted until further trial.

3. BARCLAY

Origin.—This variety has been known since 1895. The original tree, found in a planting near Knightsen, Calif., came from the seed of a bitter almond. It was first propagated and distributed in the Oakley, Antioch, and Knightsen districts by Walter Barclay, who was impressed with its bearing habits. The variety has been confined almost entirely to these districts, where a few tons of the nuts are harvested annually.

Description

TREE

Upright (ratio of height of head to width, 1 : 1), spreading at the top, lower branches drooping, top somewhat bushy, branches rambling. Growth moderately vigorous. Trunk stocky, long; bark medium rough, exfoliating in large flakes.

Main branches.—Medium short and stocky, rather upright, tend to curve or grow crooked; branching angle widely acute. Bark reddish brown, frequently with gray patches of epidermis; exfoliates in rather large flakes.

Twigs.—Growth medium. Branching angle acute. Nodes rather large. Internodes medium in length (½ to ¾ inch). Wood brittle. Bark medium tough, light green, smooth, with small quantity of bloom.

Lenticels.—Medium to numerous in number; large (on wood 8 to 10 years old, average size 3/32 by ⅜ inch), long, wide-elliptical; sides bulge in center; apexes acute. On older wood very long, acuminate, raised, rough, dark gray.

Foliage.—Of medium density. Leaves flat or gently rolled upward from midrib, frequently twisted with wavy margin, especially late in season. Many small leaves on old wood, especially in dry seasons. (See Pl. XXI, *B.*)

Blade: Medium in size (⅝ by 3 inches, ratio of width to length, about 2:9). Mature leaves, long, narrow, ovate or ovate-elliptical. Immature leaves usually elliptical; widest portion at a point one-third way from base to apex. Base wide, obtuse, sometimes acute; origin of sides usually symmetrical or very slightly unsymmetrical. Apex bluntly acute. Margins gently curving from widest portion to apex; crenations very shallow, long, frequently serrations present. Midrib, prominent. Veins distinct. Upper surface glossy, bright deep green; lower surface dull green.

Petiole: Medium length (⅞ inch; ratio of length of petiole to length of blade, 2:7). End of petiole where attached to stem has a tendency to widen. Groove shallow, wide. Upper surface of blade usually tinged with red. Glands two to four, generally two, nearly opposite, globular, yellowish, small, on petiole near base of blade.

Bearing habit.—On spurs; mostly on wood 2 and 3 years old. Spurs rather stocky (⅛ inch), medium in length (¼ inch); expand rapidly to oval disk 3/16 by ¼ inch. Buds conical, pointed, constricted at base.

NUT

Immature nut.—Size variable, average medium (1¾ by 1⅛ by ⅞ inches). Shape ovate, i. e., part to ventral side of axis ovate; part to dorsal side oval. Ventral edge curved more than dorsal, curved most near base, gradually decreasing in curve until apex is reached; ventral ridge absent or slight; ventral suture depression 1/32 inch wide by 1/64 inch deep. Dorsal edge plump, generally curved, curving sharply at tip, at which point it is frequently incurving. Base round or bluntly tapering; stem cavity 1/32 inch deep, ⅛ inch across, and dorsally sloping. Rudiment small.

Hull: Outer surface green, turning yellowish green and finally to grayish brown; pubescence abundant, medium in length, medium coarse, felty, gray. Inner surface green at first, turning to dark reddish brown as dehiscence proceeds, frequently with margins darker than the rest of the nut. Dehisces along ventral edge, the halves spreading open at the base and curling inward at the apex. Does not dehisce on dorsal edge excepting short cracks at base and apex.

Hulled nut.—(Pl. I, *C.*) Size variable, small to medium (1⅛ by ¾ by 9/16 to 1⅜ by 1 by 11/16 inches). Number of nuts to the pound, 136 to 210. Percentage of kernel to nut in hand-cracked samples, 48.

Shape: Moderately plump, ovate; moderately wide; viewed edgewise, distinctly ovate, with sides generally symmetrical, curving regularly. Ventral edge much curved, curve gradually increasing from middle to apex. Wing distinct, moderately pronounced, rather thin, running entire length of ventral edge, ending in a sharp tip at apex of nut. Dorsal edge quite straight, being very slightly curved, distinctly ridged throughout its entire length. Base plump, round, or very slightly truncate. Stem scar small; slightly dorsally sloping, occasionally at right angles to axis. Axis close to dorsal edge of nut. Apex acute, with mucronate point. Viewed edgewise, sides at apex curve sharply outwards.

Shell: Color of outer surface light to dark brown. Ventral edge decidedly pink in color, the pink color being especially striking shortly after the nut is hulled; after a few months the bright pink fades to a pinkish brown. Pits numerous, especially near apex, variable in size, deep, usually round. Short grooves along edge of wing run obliquely outward toward apex, a few short grooves at base. Surface between pits stippled. Shell generally soft, but varies in this respect, outer shell being sometimes soft and crumbly and sometimes so hard as to render cracking with the fingers difficult. Canals large. Inner shell hard. Inner surface light brown, smooth, with very slight ridges.

Ventral streak dark brown, medium to short in length, tapering from middle to apex, wide, base wide.

Kernel: Usually plump; ovoid; medium to rather large size ($\frac{7}{8}$ by $\frac{1}{2}$ by $\frac{3}{8}$ to $1\frac{1}{8}$ by $\frac{5}{8}$ by $\frac{3}{8}$ inches), filling the shell cavity quite well. Viewed edgewise, the shape is ovate with straight sides, giving apex end of kernel a decidedly cuneiform appearance. Base plump, thick; ventral shoulder round, thick; dorsal shoulder thin, square, and humped. Apex cuneiform in both the flatwise and edgewise view, thin, with sharp point. Pellicle various shades of brown; varies in thickness and toughness and in the amount of pubescence, usually having the most pubescence at apex end; pellicle fold on apex half of ventral edge thin, prominent; veins prominent. Flavor slightly sweet.

Distinguishing characteristics.—The striking pink color on the wing and ventral edge of this nut is sufficient to distinguish it from others.

COMMENTS

On account of the early blooming of this variety (February 10 to 22 at Oakley, or about the same as I. X. L.) it is liable to injury by frost. The nuts are irregular in size, averaging small. The texture of the shell varies so much as to put some of the nuts in the soft-shell class and others in the medium hard-shell class. Although the kernel is fair, the variety can not compare with the superior Hatch varieties. It is a second-rate nut and should not be planted. Grown principally in the Oakley-Brentwood-Antioch district.

4. BATHAM (BATHAM'S EVERBEARING)

Origin.—The original tree of this variety, first noticed in 1894, is a seedling growing on the C. F. Batham ranch near Chico, Calif. Mr. Batham became interested in the tree because of its late blooming habits, its long period of blossoming each year, and its heavy-bearing qualities. From this seedling he propagated a few trees which in turn bore well, and later his neighbors planted a number of trees of the variety. The original tree has yielded an average of 39 pounds of nuts yearly for the last nine years, the smallest annual yield being 15 and the largest 56 pounds.

Description

TREE

Vigorous grower. Wide spreading (ratio of height of head to width, 1:1.7). Top rather flat. Trunk quite stocky with a tendency to grow somewhat crooked with slightly twisted grain; bark medium in roughness, exfoliates in small patches.

Main branches.—Medium in length, rather stocky, with tendency to grow horizontal, scraggly; lower branches drooping. Branching angle very wide. Wood of medium toughness. Bark rather smooth except on old branches, yellowish brown, frequently with thin gray epidermis; commonly striated on young branches.

Twigs.—Thrifty in growth, rather stocky. Branching angle very wide. Wood rather tough. Nodes quite large. Internodes medium in length ($\frac{1}{2}$ by $1\frac{3}{4}$ inches). Bark thick, tough, light green when young, with reddish or brownish patches in autumn.

Lenticels.—Exceedingly numerous, gray or brownish gray, raised, small, wide elliptical, short except on old bark (size on bark 8 to 10 years old $\frac{1}{16}$ by $\frac{3}{16}$ to $\frac{1}{16}$ by $\frac{5}{16}$ inch; on 5-year-old bark, $\frac{1}{3}$ by $\frac{1}{8}$ inch), with crack through center longitudinally. Apexes acute; much longer in proportion to length on old than on young bark. On twigs, lenticels numerous, wide, oval, gray, much raised, conspicuous.

Foliage.—Dense. Leaves remain on the tree late in fall, start growth in spring before blossoming has ceased, tend to be borne in clusters on old wood, flat or rolled slightly horizontally along midrib, slightly recurving, many small leaves on old wood.

Blade: Medium to rather large ($\frac{3}{4}$ by $2\frac{7}{8}$ to $1\frac{1}{2}$ by 5 inches; average, $1\frac{1}{8}$ by $3\frac{1}{2}$ inches; ratio of width to length, about 1:3). Shape, ovate to elliptical-ovate; widest portion usually at a point one-third of distance from base to apex. Base usually broad, obtusely rounding, sometimes acute; origin of sides generally unsymmetrical. Apex half of leaf generally tapering, acute to acuminate. Margins with deep short crenations; sometimes serrate or doubly serrate; bristle exceedingly short. Midrib medium in size and in prominence, pale in color. Veins distinct and frequently elevated on lower surface. Upper surface, medium light velvety green. Lower surface dull in color, a little lighter than the upper.

Petiole: Slightly twisted, generally rather long, but varies much in stockiness and length (length, $\frac{1}{2}$ to $1\frac{1}{2}$ inches; average, about $\frac{7}{8}$ inch; ratio of length of petiole to length of blade, 1:4); larger in diameter where attached to twig than elsewhere. Under surface in midsummer is pale greenish yellow. Upper surface light green, tinged with red in autumn. Groove deep; rather wide. Glands, two to four, medium sized, wide oval, dark brown or rusty red on petiole. Pairs of glands seldom opposite each other; frequently the basal crenation of the blade on one side next to the petiole is glandular.

Bearing habit.—Heavy and rather regular bearer. Tendency to bear in clusters. Bears on wood 1 to 5 years old; mostly on wood 2 and 3 years old. Bears mostly on spurs, but has a considerable number of nuts on 1-year-old twigs. Some nuts borne in pairs. Spurs long ($\frac{1}{4}$ to $\frac{3}{8}$ inch) and stocky ($\frac{1}{8}$ to $\frac{3}{16}$ inch), but variable; expand gradually to wide-oval disk ($\frac{3}{16}$ by $\frac{1}{4}$ inch). Nuts adhere to spurs tightly until thoroughly mature, when they break away easily. Buds free, very large, very long, conical, tapering, sharp pointed; bud scales dark reddish brown, thin, hard, tough, with small amount of very short fine pubescence on edges. Flower buds on laterals as well as on spurs.

NUT

Immature nut.—Size generally large ($1\frac{1}{2}$ by $1\frac{1}{4}$ by $1\frac{1}{8}$ to $1\frac{3}{4}$ by $1\frac{3}{8}$ by $1\frac{1}{4}$ inches). Shape wide ovate; part on ventral side of axis, ovate; on dorsal side, long ovate or sometimes long obovate. Ventral edge much curved, nearly describing a half circle; without ridge ($\frac{1}{4}$ inch wide, $\frac{1}{32}$ inch high). Suture depression narrow ($\frac{1}{16}$ to $\frac{1}{8}$ inch), seldom deep, deepest at base ($\frac{1}{64}$ to $\frac{1}{32}$ inch), suture line distinct. One side of edge near suture sometimes elevated more than the other. Dorsal edge rather straight and very gently curving in middle, curves sharply at apex and very sharply near base. Base sloping dorsally, ventral shoulder very rounding and much above stem scar, dorsal shoulder below stem scar, cavity very shallow ($\frac{1}{64}$ inch deep, $\frac{1}{4}$ to $\frac{3}{8}$ inch wide). Apex broad and round with dorsal edge curving more than ventral; suture line frequently depressed just to ventral side of rudiment; style drops early; rudiment $\frac{1}{32}$ to $\frac{1}{8}$ inch long, covered with pubescence.

Hull: Outer surface either smooth or slightly bumpy, green, becoming dull red when mature; short grooves at base, pubescence very short, very fine, silky, gray, medium abundant, most abundant at apex. Inner surface as dehiscence starts is greenish gray. Frequently edges of hull are pink. In dehiscing, hull starts to split first on ventral edge and then on dorsal edge, either at its base or apex end. When the hull is completely divided into halves it remains attached at base, but frequently the hull dehisces along ventral edge only. Cracks crosswise at the apex are common. Nut matures August 15 to September 25.

Hulled nut.—(Pl. I, *D*.) Somewhat variable; medium to large ($1\frac{1}{4}$ by 1 by $\frac{5}{8}$ inches to $1\frac{1}{2}$ by $1\frac{1}{8}$ by $\frac{3}{4}$ inches). Number of nuts to the pound, 120 to 190. Percentage of kernel to nut in hand-cracked samples, 42.

Shape: Moderately plump, ovate; wide in proportion to length. Viewed edgewise, ovate, but frequently unsymmetrical, sides bulging. Ventral edge clear cut and sharply curving. Wing moderately to quite prominent, especially near its middle. Flange of medium thickness. Dorsal edge quite straight, curving at ends, generally sharply curving inward at apex, with slightly elevated dorsal ridge most prominent at ends. Base rounding. Stem scar variable in size, usually quite small, slightly depressed, sloping slightly toward the dorsal edge, sometimes at right angles to the axis. Apex obtusely pointed with short mucronate tip. Thickness of point varies. Viewed edgewise, the sides at the apex generally curve outward.

Shell: Outer surface light brown, soft, and generally somewhat crumbly, but this varies with the season. Sometimes the shell is covered with a pale, gray, flaky substance. Pits numerous, medium to large, round. Surface between pits rough and spongy, usually stippled. Grooves for a short distance at base end. Short grooves run out obliquely on both sides of ventral edge, the angle which they make with the wing being most acute a short distance from the base end of the nut. Fibers very large. Inner shell thin. Inner surface light brown, smooth, wavy, with short, round, wide, very slight depressions. Ventral streak dark brown, wide, medium to long, sides from middle to apex gently curving until they come to a point at the apex. Base end of ventral streak frequently pointed.

Kernel: Doubles frequent; size medium to large ($\frac{7}{8}$ by $\frac{9}{16}$ by $\frac{3}{8}$ to $1\frac{1}{8}$ by $\frac{5}{8}$ by $\frac{3}{8}$ inches). Generally does not quite fill shell, plump and wide, flattening and wrinkling when drying, but not so much as in the I. X. L. Shape elliptical or ovate-elliptical. Edgewise view, long-ovate. Dorsal edge thinner than ventral. Ventral edge thick, rounding. Base usually quite round, but frequently dorsal shoulder bulging. Apex well filled, wide, thick, round, with small distinct point. Pellicle light to dark brown in color, tough, heavily pubescent; pellicle fold on apex half of ventral edge thin and small. Flavor pleasantly and mildly sweet. Quality fair.

Distinguishing characteristics.—Nut ovate, rather plump, quite wide; ventral edge characteristically sharply curved, nearly in the form of a circle, wing moderately prominent; dorsal edge much curved; texture of outer shell crumbly; kernel plump and well filled at tip, pubescent, base rounding, doubles common.

This nut resembles in shape the Henley, I. X. L., Smith, and Trembath. It is more plump than the Henley, the dorsal edge curves more, the shell is more crumbly, the kernel is longer, and the apex less tapering.

The Batham is easily distinguished from the I. X. L. by the following three points: The nut is more plump; the base always slopes dorsally, never ventrally; the dorsal shoulder of the kernel is always round—never square and humped, as in the I. X. L.

The Batham is distinguished from the Smith as follows: The nut is somewhat more plump, the shell is lighter in color, the kernel is more plump, smooth, and with dorsal shoulder round; in the Smith the dorsal shoulder of the kernel is commonly square and humped, and a deep irregular crease is often present in the sides of the kernels.

The Batham nut closely resembles the Trembath in shape, but the latter is more flat and has the wing much more pronounced at the apex.

COMMENTS

The chief points in favor of this nut are its late and long-blooming habit (blooms a few days later than the Drake), which enables it to escape early frost injury in the spring, and its heavy-bearing habit. Points against it are that 17 per cent of its kernels are doubles, that the pellicle is heavily pubescent, and that the outer shell is easily chipped in handling. The kernel is plump, of good appearance, and resembles the Nonpareil somewhat in shape, but on the whole is inferior to that variety. The unshelled nut is not so attractive in appearance as the I. X. L. Growers state that the nuts of the Batham are difficult to harvest if attempts are made to knock them from the trees before they are thoroughly ripe; otherwise there is no difficulty in harvesting. The nuts ripen a few days ahead of the Drake. The Batham nut is superior to the Drake, but inferior to the Nonpareil and I. X. L. Commercial plantings of the Batham almond are confined to the Chico district, where this variety escapes many of the spring frosts which frequently injure the early-blooming varieties in the locality. The variety has not been widely advertised, and only a few trees have been planted in other sections.

5. BIDWELL (BIDWELL'S MAMMOTH)

Origin.—A seedling variety originated on the Bidwell ranch, at Chico, Calif., in 1881. The original tree is not now in existence. At one time the variety was widely planted in California. While a few trees still remain in various other sections, at present most of the trees of this variety are in the Chico-Durham districts.

Description

TREE

Upright (ratio of height to width of head, 1:1). Very vigorous grower. Round topped head as a rule. Trunk very stocky and vigorous, irregular in shape; when propagated on peach stock grows somewhat faster than the root; bark rough, exfoliates in small patches.

Main branches.—Growth vigorous; long and somewhat slender, upright. Branching angle acute. Wood moderately brittle. Bark rough on old branches, exfoliates in rather thin flakes. On young branches, bark dark brown, often with thin layer of gray epidermis, frequently striated.

Twigs.—Top of tree slightly willowy. Twigs make good vigorous growth, rather slender and flexible. Wood somewhat brittle. Nodes large. Internodes short (⅓ to 1 inch long). Bark thick, moderately tough, green in early summer, tinged with red in autumn.

Lenticels.—Very numerous, very large (size on bark 8 to 10 years old, ⅛ by ½ to ⅛ by ¾ inch; on bark 5 and 6 years old, 1/16 by 3/16 inch), very much raised, rough, cracked longitudinally, brownish gray; frequently run together endwise on older wood. Shape elliptical with curving sides; ends acute, extreme apexes frequently acuminate. On young wood, much raised, gray, conspicuous. (See Pl. XVI, *A.*)

Foliage.—Quite dense. Leaves tend to twist slightly, and when they do not they are slightly recurved.

Blade: Varies much in size (¾ by 2 to 1½ by 4¼ inches), average medium (1 by 3 inches). Shape wide ovate (ratio of width to length, 1:3). Base rather acute and tapering, sides curving gently outward; origin of sides usually symmetrical. Apex tapering for one-half to two-thirds the length of blade, extreme apex usually sharply acute but sometimes bluntly rounding. Margin frequently irregular; rather finely crenate, doubly crenate, or serrate. Midrib rather large, prominent, pale in color. Veins small but distinct, elevated on under surface. Upper surface light green and glossy. Lower surface dull, lighter green than upper.

Petiole: Rather short (average length, ¾ inch; ratio of length of petiole to length of blade, 1:4). Varies in thickness, inclined to be stocky. Light green in color, reddish in fall. Groove medium in width to narrow; rather shallow, especially near point of attachment to twig. Glands usually two, small, globular, dark brownish yellow, on petiole close to base of blade. Lower one or two basal crenations frequently glandular.

Bearing habit.—Tends to be an alternate bearer, having a light crop one year and a heavy crop the next. Bears on spurs, principally on wood 2 and 3 years old. Spurs rather stocky (3/32 inch), short to medium in length (3/16 to ¼ inch); expands suddenly to disk, ¼ by ⅜ inch in size. Buds exceedingly large, long, plump, sharp pointed, free, constricted and compressed at the base. Scales very large, thick, brittle, waxy, reddish brown, with a rather large quantity of long, grayish yellow pubescence.

NUT

Immature nut.—Very large (average 2½ by 1½ by ½ inches). Very plump. Widest near base. Shape, ovate, i. e., part on ventral side of axis ovate, part on dorsal side long oval. Ventral edge curves more than dorsal, curves most near shoulder; ridge prominent (⅛ inch high, ⅜ inch wide). Suture line down middle or slightly to one side of middle. Dorsal edge rather straight, plump, curves most at base and apex. Base plump, round, dorsally sloping, grooved and ridged, ventral shoulder round. Apex broadly pointed; style drops early; rudiment a mere bump.

Hull: Outer surface rough, bumpy; green. Pubescence abundant, long, medium coarse, gray; small bumps give surface appearance of rough velvet. Inner surface green at first, turning brown gradually. Irregular in manner of dehiscing. Dehisces along ventral suture first; halves spread apart equally as a rule, ventral edges curl outward; frequently dehisces along both dorsal and ventral edges, the apex portions of the halves spreading apart equally. Harvesting dates, August 25 to September 20.

Hulled nut.—(Pl. II, *A.*) Large but variable in size even on the same tree (1½ by 1 by ¾ to 2 by 1½ by 1¼ inches). Number to the pound, 50 to 70. Percentage of kernel to nut in hand-cracked samples, 25.

Shape: Variable and irregular, but characteristic; wide, pointed, ovate, usually somewhat cordate, but sometimes almost rectangular, very wide in proportion to length, plump near base, but rather thin at apex. Ventral edge much curved. Flange pronounced, thick; flange and portion near it marked with oblique ridges; also one or two longitudinal depressions and ridges present on ventral edge. Ventral suture usually showing in winged flange as a line. Frequently there is a depression near stem scar on ventral side. Dorsal edge prominent, grooved or pitted, quite straight. Viewed edgewise, nut is symmetrical and ovate, with apex half cuneiform. Base truncate or slightly oblique. Stem scar medium in size, usually dorsally sloping. Apex somewhat tapering, but variable; extreme apex either blunt or somewhat pointed; usually depressed on ventral side.

Shell: Hard; no difference between inner and outer shell in regard to hardness. Inner surface dark brown, smooth. Ventral streak much darker brown than rest of inner surface, long, wide ($\frac{7}{32}$ inch wide), base end bluntly rounding; tapers toward apex.

Kernel: Some doubles; large, but small for size of nut (1 by $\frac{5}{8}$ by $\frac{5}{16}$ to $1\frac{1}{8}$ by $\frac{3}{4}$ by $\frac{7}{16}$ inches), flat, seldom filling shell cavity. Ovate, base end frequently truncate; ventral shoulder round and plump; dorsal shoulder round or oblique and thinner than ventral shoulder. Pellicle dark brown, rather thick, heavily pubescent; pellicle fold on apex third of ventral edge. Flavor fair, slightly sweet.

Distinguishing characteristics.—Nut very large, shell hard, shape cordate, base plump, stem scar sloping dorsally; flange thick and prominent. One of the easiest varieties to identify.

COMMENTS

The variety is of little account. The shell is too hard and the proportion of kernel to shell is too small to make the nut acceptable commercially. It became popular chiefly as a pollinizer for other varieties. Its blooming date is such that it pollinates the Hatch varieties.

6. BIGELOW (BIGELOW'S SEEDLING)

Origin.—A variety originated from a seedling on the M. J. Bigelow ranch, at Oakley, Calif., in 1896. The original tree is still living. Mr. Bigelow was impressed by the good bearing qualities of the tree. The variety was distributed to a number of growers in the section and is now grown to a considerable extent in the Oakley-Brentwood-Antioch districts.

Description

TREE

Rather upright (ratio of width to height of head, 1:1.1). Round topped. Branches profusely. Trunk stocky, vigorous grower; bark rough, exfoliating in thick patches.

Main branches.—Medium in length and somewhat stocky; rather upright. Branching angle moderately acute. Bark rough on old branches, smooth on branches under 7 years of age, reddish brown in color; frequently with gray epidermis.

Twigs.—Quite stocky, may be straight or crooked. Branching angle moderately acute. Wood brittle. Nodes medium size. Internodes rather short. Bark thick and tough, dull pale green, slightly tinged with red in the fall.

Lenticels.—Moderately numerous. Wide in proportion to length. Oval with tapering ends, gray, slightly raised on old wood, but on young wood nearly level with surface of bark. Gray flakes of bark around lenticels are common. On young bark lenticels are inconspicuous, due to gray epidermis. Size of lenticels on bark 8 to 10 years old, $\frac{1}{16}$ by $\frac{3}{16}$ to $\frac{3}{32}$ by $\frac{3}{8}$ inch. On 7-year-old bark or younger, lenticels very wide and short. On twigs, very small.

Foliage.—Quite dense.

Blade: Medium in size to rather large ($\frac{7}{8}$ by $2\frac{1}{4}$ to $1\frac{1}{8}$ by $3\frac{3}{4}$ inches, average $\frac{7}{8}$ by $3\frac{1}{4}$ inches, ratio of width to length, about 2:7). Shape variable, ovate, elliptical, ovate-elliptical, sometimes widely obovate; about 2 per cent of the leaves are round, spatulate, or small odd-shaped ones, with round, truncate, or lobed apex. The Bigelow tree can be identified by these "off-shaped" leaves. Base variable, bluntly obtuse to acute; origin of sides usually symmetrical, but often slightly unsymmetrical. Apex variable, tapering, acute to moderately acute. Margin irregularly and shortly crenate. Color of upper surface, smooth, glossy, dark green. Under surface dull and slightly lighter than upper. (See Pl. XVIII, *B*.)

Petiole: Varies in length ($\frac{1}{2}$ to $1\frac{1}{4}$ inches, average, 1 inch) and thickness; ratio of length of petiole to length of blade, about 1:3. Pale green, tinged with red in autumn. Groove varies in width, shallow. Glands two to six, vary in size, globular, brownish yellow. One of the few varieties having stipules; many leaves have one or two stipules $\frac{1}{8}$ inch long, on petiole near base of blade or on the base of the blade itself.

Bearing habit.—Bears on spurs on wood 2 to 4 years old. Many spurs in clusters, others single; rather long (⅜ inch), slender (⅛ inch); expands gradually to form disk ¼ by 5/16 inch. Buds long, bulge in middle, constricted at base; outer scales thick, coarse, reddish, frequently gray on edges.

NUT

Immature nut.—Medium in size (1½ by 1⅛ by ⅞ to 1¾ by 1¼ by 1 1/16 inches). Usually oval; sometimes slightly obovate. Edgewise view oblong oval. Ventral edge plump, curved more than dorsal; no ventral ridge; suture line narrow and distinct (1/16 inch wide and 1/64 to 1/32 inch deep). Dorsal edge rather straight or very gently curved, plump, curved most at apex, base part frequently slightly recurved. Base plump, round, smooth (seldom grooved), usually slightly sloping either ventrally or dorsally, many times at right angles to axis; ventral shoulder rounding; dorsal shoulder square, but not prominent. Cavity shallow (1/32 inch deep and 5/16 to ⅜ inch across). Apex plump, very bluntly round. Style usually remains on until dehiscence starts; rudiment, very small.

Hull: Outside green when young, but turns reddish brown before dehiscence begins. Pubescence very short, abundant, coarse, gray, felty. Inner surface pale green when first dehiscing, rapidly changing to dark brown. Hull is frequently pink when broken open. Dehiscence starts on ventral edge. Halves open equally or unequally. Cracks along apex or base on dorsal edge and short cracks occur on halves at base as dehiscence proceeds; tendency to curve in at apex and base.

Hulled nut.—(Pl. II, *B.*) Variable in size, rather small to medium (⅞ by ⅝ by ½ to 1⅜ by ⅞ by ¾ inches). Shape and character of shell varies in different seasons. Number of nuts to the pound, 160 to 300.

Shape: Somewhat elliptical, either plump or flat, usually medium in plumpness. Axis ⅓ to ¼ of way from dorsal edge to ventral. Ventral edge sharply and evenly curved. Wing distinct and clear cut throughout entire length, sharply curving at apex, either straight or curved at base. Dorsal edge straight except for curve at apex and base. On dorsal ridge is a wide distinct line, darker than the rest of the surface of the shell. Base with ventral edge straight to the stem scar or with ventral edge sharply curving. Stem scar near dorsal edge, small, usually lighter in color than rest of shell, at right angles to axis or sloping ventrally, seldom dorsally. Apex blunt with slight suggestion of a mucronate point.

Shell: Dark brown; varies in color even on same tree. Character of shell varies in different seasons, usually firm texture. Outside portion scuffs off from rough handling. Pits large, round, shallow. Surface between pits usually stippled. Sometimes outer surface is flaky. A few lines and grooves along ventral edge; grooves run out from stem scar for a small distance. Inner shell very thin. Outer shell crumbly and porous, especially near inner shell. Fibers large. Inner surface much lighter in color than outer. Ventral streak dark brown, much darker in color than inner surface of shell, rather wide; bluntly pointed at base.

Kernel: Size medium to rather large (average 1 by 9/16 by 5/16 inch). Dark brown, ovate, with dorsal edge straighter than ventral edge, but curved. When viewed edgewise sides slope to a point. A marked character of the kernel is a depression on one side. Dorsal shoulder rather square. Ventral shoulder round. Apex pointed. Pellicle dark brown, thin; pubescence medium in amount; pellicle fold on apex half of ventral side. Flavor mild, sweet.

Distinguishing characteristics.—Outer surface of shell dark brown, inner surface usually lighter in color than outer, pits numerous and large, nut rather elliptical in shape, ventral edge sharply curved, dorsal edge nearly straight; kernel ovate, often with square dorsal shoulder, pellicle dark brown, depression on one side of kernel common.

The nut of this variety closely resembles the Fair and Hudson in shape and when large looks somewhat like the Ne Plus Ultra. When seen among these varieties it can be recognized by its dark-colored shell. The fact that its kernel is irregular at the base and the side frequently depressed makes it possible to separate the variety from the three mentioned.

COMMENTS

This variety blooms a little earlier than the Nonpareil and ripens late (very last of August and early September). The kernel is unattractive, owing to the dark pellicle. The variety is a good bearer and has therefore been a favorite with some growers. It is inferior to the Nonpareil, I. X. L., and Ne Plus Ultra from a marketing standpoint and should not be widely planted.

7. BROWN (BROWN XX)

Origin.—Said to have originated on the John Henle ranch, near Davis, Calif. The variety has not been widely planted.

Description

TREE

Large, vigorous, spreading (ratio of height to width of head, 1:$1\frac{1}{4}$), rather open. Trunk very stocky; bark rough, exfoliating in small, thick patches.

Main branches.—Long, medium stocky, tend to grow curved or crooked. Branching angle rather wide. Wood moderately tough, somewhat gnarly. Bark very rough; heavily striated with gray on young branches; under bark dark yellowish brown, overlaid on old branches with several layers of gray; exfoliates in thick patches; young branches commonly heavily striated with gray.

Twigs.—Long, vigorous, slender. Branching angle wide. Wood rather tough. Nodes small to medium. Internodes short ($\frac{3}{8}$ to 1 inch). Bark thick, quite tough, light green, turning dull red on upper side in fall; light bloom.

Lenticels.—Numerous, small, greenish gray, rather conspicuous on young twigs. On older bark, rather numerous, much raised, rough, quite large (on bark 8 to 10 years old $\frac{1}{16}$ by $\frac{1}{4}$ by $\frac{3}{32}$ by $\frac{3}{8}$ inch), long, narrow, but vary somewhat in width. Apexes acuminate to acute, dark gray.

Foliage.—Very dense on individual branches. Leaves much recurved.

Blade: Size varies much ($\frac{5}{8}$ by $2\frac{1}{8}$ to 1 by $3\frac{3}{4}$ inches; average medium, $\frac{3}{4}$ by $3\frac{1}{4}$ inches, ratio of width of blade to length, about 1:4). Shape, long-ovate or elliptical. Base varies from very bluntly rounding to acute; origin of sides usually unsymmetrical. Apex sharply acute to bluntly acute, apex two-thirds of leaf tapering. In the elliptical leaves, apex is more acute than base. Margins frequently irregular, crenations coarse, bristle very small. Midrib medium in size and prominence, very light in color. Veins moderately distinct. Upper surface of blade glossy, distinctly yellowish green, so much so that the tree can be distinguished from others by the color. Lower surface light green.

Petiole: Long ($\frac{3}{4}$ to $1\frac{1}{4}$ inches; average, 1 inch; ratio of length of petiole to length of blade, about 1:3), medium in diameter, rigid. Under surface pale green, upper yellowish green tinged with dark red in the fall. Groove narrow and deep. Glands two to eight, commonly six, frequently three or four, medium sized, globular or oval, frequently much elevated, yellowish or grayish yellow on petiole near base of blade or on base of blade.

Bearing habit.—Mostly on spurs on wood 2 and 3 years old, but also some on laterals. Compound spurs numerous, long ($\frac{1}{2}$ inch), single spurs rather long ($\frac{1}{4}$ inch), medium in width ($\frac{1}{8}$ inch), disk nearly round (diameter, $\frac{1}{4}$ inch). Many fruit buds on laterals as well as on spurs. Buds free, long, conical, slightly compressed at base, bluntly pointed; scales reddish brown, medium sized, rather thick, somewhat tough with long gray pubescence on edges.

NUT

Immature nut.—Medium size ($1\frac{7}{8}$ by $1\frac{3}{8}$ by 1 inches). Long, pointed, ovate. Ventral edge circular near base, almost straight on apex half; no ventral ridge, but one half near suture frequently higher than the other. Ventral suture narrow ($\frac{1}{32}$ inch), shallow ($\frac{1}{64}$ inch), dorsal edge very gently curved, curved most sharply at apex. Base dorsally sloping, scalloped with light grooves and ridges, dorsal shoulder square and sloping but not prominent, ventral shoulder round, ventral suture slightly depressed at cavity. Cavity shallow ($\frac{1}{64}$ to $\frac{1}{32}$ inch), narrow ($\frac{3}{16}$ inch). Apex half of nut decidedly tapering and pointed; ventral suture at apex slightly depressed; style drops early, leaving very small rudiment.

Hull: Outer surface grayish green, becoming yellow as dehiscence starts and remains so until hull gets quite dry; pubescence abundant, medium fine, short, gray. Inner surface gray as it starts to dehisce, changing rapidly to brown. Starts dehiscing on ventral edge, then up dorsal edge from apex, cracking all the way up dorsal edge, halves remain attached at base, spread open at apex, and curl inward much. Many nuts dehisce on ventral edge only. Nuts mature from August 12 to September 10 and ripen unevenly.

Hulled nut.—(Pl. II, *C.*) Size small to medium (average 1⅜ by ⅞ by 9/16 inches). Number of nuts to the pound, 165 to 200. Percentage of kernel to shell in hand-cracked samples, 40.

Shape: Moderately plump, ovoid, tapering to a point. Axis almost through middle of nut. Ventral edge curved, curved more than dorsal edge. Wing distinct and quite heavy, usually medium in prominence, with blunt edge. Dorsal edge curved less than ventral. Base plump and bluntly round. Stem scar small to large, round, depressed at right angles to axis or sloping slightly dorsally (very seldom ventrally). Apex pointed with acute tip.

Shell: Soft; outer surface medium brown. Pits vary in size, mostly round. Surface between pits usually stippled but sometimes smooth. Outer shell chips off somewhat in handling. Canals large, oval, fibers large. Inner shell darker brown than outer. Ventral streak dark brown, wide to medium, base blunt.

Kernel: Size, medium to quite large (1 by ½ by ⅜ inch). Some doubles (20 per cent). Color attractive, light brown. Varies in shape, but generally long oval and tapering to a point both in edgewise and sidewise view. Plump. Ventral shoulder more round and sloping than dorsal. Pellicle thin. Pubescence short. Pellicle fold on apex half of ventral edge.

Distinguishing characteristics.—Classified according to shape, the Brown belongs to the group including the Cartagena, Concord, Fairoaks, Golden State, Rice, and Routier. On account of the close resemblance in shape, the nuts of these varieties are often confused with one another. Furthermore, various unnamed seedlings are in this class. Fortunately, with the exception of Golden State and Routier, nuts in this class are very limited as to locality where grown. The Brown is not grown outside of Yolo County and is distinguished from the six varieties mentioned by the rather plump, long, narrow kernel, tapering from the base to the apex. It closely resembles Golden State, but the Brown kernel is much longer in proportion to width and is more tapering at the apex, and the shell is lighter in color.

COMMENTS

This nut has little except its good flavor to recommend it. Its irregular ripening habit makes the harvesting of all the nuts on the same date difficult, a fact which alone would condemn it. Further planting of the variety is not recommended.

8. CALIFORNIA (CALIFORNIA PAPER SHELL)

Origin.—In California; exact locality and date unknown. The variety has been widely planted in California and to some extent in Australia. It is grown in the following districts in California: Arbuckle, Banning, Concord, Corning, Davis, Esparto, Live Oak, Lodi, Oakley, Orland, Sacramento, Suisun, Winters, Yuba City.

Description

TREE

Upright (ratio of width to height of head, 1:1¼), large, vigorous grower, branches profusely. Trunk stocky, straight, tendency to grow long; bark rough, exfoliating in small flakes on old trunks.

Main branches.—Rather long, moderately slender, upright. Branching angle acute. Wood brittle. Bark dull cherry red, commonly covered with patches of thick, ash-gray epidermis, which is often sufficient in amount to give the tree an ash-gray color at a short distance; exfoliates in thick small flakes and occasionally in large patches. Many small knots present.

Twigs.—Numerous, medium in length, rather stocky, rigid. Branching angle acute. Wood brittle. Nodes medium to small. Internodes of moderate length (½ to 1½ inches). Bark medium tough and thick.

Lenticels.—Usually very numerous; slightly raised; size varies much, small to rather large (on bark 8 to 10 years old, 1/16 by 3/32 to 1/16 by 5/16 inch), wide oval, ends acute with extreme apexes acuminate. Slightly raised. Frequently bark around lenticels is ash gray. On young wood lenticels are variable in number and irregular in shape, on twigs small and numerous.

Foliage.—Dense.

Blade: Varies in size ($\frac{9}{16}$ by $2\frac{1}{4}$ to $1\frac{1}{2}$ by 5 inches, average small, $\frac{15}{16}$ by 3 inches, ratio of width to length of blade, about 1:3). Shape ovate, with irregular curving edges, occasionally oblong-elliptical; widest part near middle, one-third distance from base. Base variable, obtuse to wide-acute; origin of margins usually unsymmetrical. Apex bluntly acute. Margin shortly and rather deeply crenate. Midrib medium large and prominent. Veins distinct. Upper surface bright, medium-dark green, shiny. Lower surface dull green. Leaves tend to curl and twist slightly, especially late in the season.

Petiole: Medium length ($\frac{1}{2}$ to 1 inch, average $\frac{3}{4}$ inch; ratio of length of petiole to length of blade about 1:4); quite slender but variable. Glands vary in number from 2 to 10, rather small, oval, yellowish brown to dark gray.

Bearing habit.—Fruit on spurs on wood 1 to 4 years old. Tendency for nuts to be borne singly. Spurs slender to medium in thickness ($\frac{1}{8}$ to $\frac{3}{16}$ inch), long ($\frac{1}{8}$ to $\frac{3}{8}$ inch); expands suddenly to small elliptical disk $\frac{5}{32}$ by $\frac{1}{4}$ inch. Buds, especially leaf buds, slightly flattened, constricted at base, short, plump, bluntly tapering at apex; scales reddish brown, medium sized, thin, with short pubescence on edges.

NUT

Immature nut.—Size medium ($1\frac{1}{2}$ by $1\frac{1}{8}$ by 1 inches). Shape: Nearly round; part on ventral side of axis cordate, ventral edge much curved, ridge well marked but not prominent ($\frac{1}{4}$ inch wide), with depressions on each side of it. Dorsal edge considerably curved, but curved less than ventral. Base slopes much dorsally, usually grooved; ventral shoulder above stem scar; dorsal shoulder rounding and sloping, but prominent. Apex bluntly rounding, frequently depressed. Style drops early.

Hull: Green outside, pubescence gray. Usually starts to dehisce in middle of ventral edge, the line of dehiscence soon traversing entire ventral edge. The halves then open, usually equally, and as opening continues the hull splits up dorsal edge from apex upward; usually the halves of the hull also split upward from apex, the hull finally being in quarters or with quartered apex (fig. 13). Many times dorsal edge does not completely dehisce. As hull dehisces inside surface changes from light green to brown. Sometimes hull is slightly tinged with red on apex and ventral edge. Nuts mature August 5 to 30; they tend to hang tightly to the spurs and are, therefore, difficult to knock.

Hulled nut.—(Pl. II, *D.*) Rather small to medium and uniform in size (average, $1\frac{1}{4}$ by 1 by $\frac{11}{16}$ inches); number of nuts to the pound, 210 to 240.

Shape: Very short and very wide, ovate or oval-ovate, part on wing side of axis cordate, axis about one-third way from dorsal edge. Viewed edgewise nut is plump-ovate or oval-ovate. Ventral edge curved as in a heart-shaped figure; wing very prominent along entire ventral edge, very prominent at base, usually decreasing in prominence at immediate apex, terminating in an acute point at apex end, tapering to a very thin edge. Dorsal edge curved slightly but much less than the ventral edge. Strong fiber the entire length of dorsal edge. Dorsal ridge narrow and only slightly elevated. Base sharply sloping dorsally, medium plump. Stem scar rather large, long, and narrow, sloping dorsally. Apex bluntly pointed as a rule, frequently with mucronate tip.

Shell: Paper shell, thin. Outer surface brown, frequently reddish brown, rough, consisting of a flaky, spongy material, stippled. Outer flaky material rough owing to network of heavy fiber underneath, which frequently shows through; outer shell usually knocked partly off and adhering to hull in hulling. Pits medium numerous, when not covered with flaky material, small, shallow. Inner shell thin. Inner surface light brown, smooth. Ventral streak dark brown, long, wide, widest at base, base end bluntly pointed.

Kernel: Plump; size medium to rather small (average 1 by $\frac{5}{8}$ by $\frac{7}{16}$ inch). Shape ovate to elliptical. Dorsal edge longer than ventral. Dorsal shoulder sloping with tendency to be square; ventral shoulder usually plump and round. Most curved portion below base scar. Apex wide and flat with small tip. Pellicle dark brown, tough, very pubescent. Flavor flat and insipid, not rich. A poor nut.

Distinguishing characteristics.—The nut of this variety resembles and is often confused with the King, Klondike, Princess, Silvershell, and Nonpareil. The California nut can be distinguished from other varieties, except those just mentioned, by the following: Paper shell, wide-cordate shape; base much dorsally sloping; nut short and wide, wing very prominent; dorsal edge much curved, especially near apex; kernel wide and short, dorsal shoulder sloping but humped, pellicle exceedingly pubescent.

The California nut resembles the King very closely. It may be distinguished from the King as follows: The shape of apex is less tapering, the wing is more pronounced at the base, the ventral streak is narrower, the kernel is less cuneiform, the pubescence on the pellicle is much heavier, and the veining is less distinct.

The California can be distinguished from the Klondike by the following: In the California nut the wing is generally more prominent, except at the extreme apex, where it is less prominent; base scar slopes more abruptly dorsally; shell is a little thinner; base of ventral streak is wide and blunt, while in Klondike it is frequently pointed: the California kernel is much more pubescent than is the Klondike, and the veins are less plain.

The California is easily distinguished from the Princess by the very abundant, coarse, long pubescence on the kernel. In the Princess the pubescence is very short and scant in quantity.

The California can be distinguished from the Silvershell by the shell, which is very much thinner and more flaky; by the apex of the nut, which is blunt instead of sharp pointed; and by the kernel, which is much more pubescent.

The California is easily separated from the Nonpareil as follows: The nut is smaller, shorter, wider at the base and apex, base slopes dorsally, while in Nonpareil the base slopes ventrally or is at right angles to the axis; the California kernel is shorter and very pubescent, while in the Nonpareil the kernel is very smooth.

COMMENTS

This variety has little to recommend it. The quality of the nut is poor. The heavily pubescent pellicle is unattractive. The variety is erratic in bearing and seldom produces a good crop. The nut adheres to the spur tenaciously, making it difficult to harvest. On account of the expense of harvesting and the light crops usually borne, this variety seldom proves profitable. It should be eliminated from commercial orchards.

9. CALIFORNIA JORDAN

Origin.—In 1883 A. M. Newland, of Colusa, Calif., planted a sack of almonds from which he secured a large number of trees of various types. One of these bore nuts somewhat resembling the Jordan in shape but smaller, with a much softer shell. At that time Mr. Newland considered this variety more promising for California than was the Jordan. Trees were distributed by Mr. Newland and by nursery firms to various sections in the State. Quite a number of trees of this variety are still grown in the Colusa district and occasional trees are found elsewhere, but the majority of them have been grafted over to other varieties or removed.

Description

TREE

Upright; looks much like the Jordan. Foliage and leaves resemble the Jordan.

Bearing habit.—Rather good bearer when blossoms escape frost. The tree blooms rather early; about the same time as the Ne Plus Ultra. Bears on spurs on wood 2 to 4 years old. Spurs frequently compound. Single spurs quite long (3/8 inch) and slender (1/8 inch), expanding gradually to form an oval disk 1/4 by 3/16 inch. Nuts frequently borne in pairs.

NUT

Immature nut.—Size medium (average, 1½ by 15/16 by ¾ inches). Crescent shaped, something like Eureka but larger. Ventral edge curved, smooth; ventral suture very shallow and narrow, a mere line; ventral edge to one side of suture more raised than other. Dorsal edge straight or curved inward. Base bluntly pointed, sloping dorsally, sometimes slightly grooved; dorsal shoulder square; ventral shoulder sloping; cavity exceedingly shallow or none. Apex pointed; rudiment large.

Hull: Outside surface green with red patches late in season. Pubescence thick, coarse, gray, woolly. Dehiscence usually along ventral suture only, but sometimes dehisces on dorsal suture as well.

Hulled nut.—Size average medium (1½ by ¾ by 9/16 inches).

Shape: Long-obovate, pointed at both ends. Ventral edge considerably curved, curving most sharply at apex, depressed at base; wing thick but not prominent. Dorsal edge very gently curved, almost straight; dorsal ridge narrow and medium prominent. Base much tapering and constricted; dorsal edge straight at base clear to edge of stem scar; ventral edge quite straight and very sharply sloping; stem scar small, long oval, at right angles to axis or sloping slightly dorsally. Apex blunt, with dorsal edge almost straight and ventral edge much curved; widest portion of nut at one-third of way from apex to base.

Shell: Heavy, too heavy to be cracked with fingers as a rule. Outer shell thin and hard. Outer surface light to medium brown. Pits few, large, rather shallow. Long fine grooves at the slender necklike base. Canals numerous, medium in size, and fibers medium. Inner shell medium thin, hard, dark brown. Ventral streak medium width, short; blunt apex.

Kernel: A considerable number of doubles. Long half oval in shape. Ventral edge much bulging, curved rather evenly throughout entire length; longer than dorsal edge. Dorsal edge quite straight. Base sharply rounded; dorsal shoulder elevated sharply above base scar; ventral shoulder sloping so suddenly that its curve is continuous with that of the ventral edge. Apex acute with nearly straight dorsal edge and curved ventral edge. Pellicle dark brown and covered with short coarse pubescence, being heavy near the apex, veins distinct; pellicle fold small, short, on apex one-fourth of ventral edge; base scar very small, inconspicuous, oval. Flavor fair.

Distinguishing characteristics.—This variety is in the group consisting of Eureka, Favorite, Gilt Edge, and Sellers. It resembles the Eureka somewhat but is larger, lighter in color, with harder shell, and is more tapering at the base. The kernels are more heavily pubescent and have a straighter dorsal edge and a more pointed base than in the Eureka.

The California Jordan is distinguished from all other varieties, except the Eureka, as follows: Obovate-crescent shape, widest portion of nut nearer apex than base, pointed ends, constricted base, thick wing lacking prominence, and recurved apex.

COMMENTS

This variety is so far inferior to the Eureka that it is not to be considered. The quantity of California Jordan nuts coming into the market at the present time is small.

10. CALIFORNIA WHITE

Origin.—A seedling originated on the A. M. Newland ranch, Colusa, Calif., and first propagated in 1887. Grown to a limited extent in the Colusa district. Occasional trees of the variety are found in other districts in California.

Description

TREE

Very upright. Moderately vigorous. Trunk generally grows somewhat faster in diameter than peach or almond stock upon which it is grafted; bark moderately rough.

Main branches.—Moderate in rate of growth. Branching angle acute. Bark quite rough on old branches; grayish brown; exfoliates in medium-sized patches. Much gray epidermis on young growth.

Twigs.—Moderate in yearly growth; tend to be rather stocky. Branching angle acute. Internodes average short (⅓ to 1 inch). Bark light green, with dull red patches in fall.

Lenticels.—Quite numerous. Large and long on old wood; apexes blunt; usually raised, dark gray.

Foliage.—Rather thin as a rule. Leaves small, willowlike.

Blade: Varies in size somewhat; mostly small (average ¾ by 2¾ inches). Shape elliptical or oval. Immature leaves very wide for length. Base bluntly acute, but variable; origin of margins usually symmetrical. Apex blunt.

Petiole: Rather long (average $\frac{7}{8}$ inch). Groove deep and narrow. Glands none or one or two.

Bearing habit.—On spurs, mostly on wood 2 and 3 years old. Spurs long ($\frac{1}{4}$ to 1 inch) and slender ($\frac{1}{8}$ inch); expand gradually to wide oval or nearly round disk $\frac{3}{16}$ inch in diameter. Blooms early.

NUT

Immature nut.—Medium to rather large ($1\frac{1}{2}$ by $1\frac{1}{4}$ by 1 inches). Shape oblong-oval, much curved; ridge prominent ($\frac{1}{8}$ inch high, $\frac{1}{4}$ inch wide); suture line well marked, running along middle of ridge or to one side. Base plump, broad, slightly truncate; stem scar with short scallops and grooves, usually at right angles to axis; cavity $\frac{1}{16}$ inch deep with abruptly sloping sides. Apex, broadly round or truncate, depressed; style adheres long, generally until dehiscence starts.

Hull: Characteristic of outer surface to be covered with bumps $\frac{1}{16}$ to $\frac{1}{8}$ inch across. Color of outer surface green, reddish brown on dehiscing; pubescence medium long, very coarse, gray, velvety. Inner surface whitish turning gradually to brown as dehiscence proceeds. Dehiscence starts on ventral edge; usually does not dehisce on dorsal edge. Halves open equally, exposing nut remarkably light in color; one half of hull curls inward more than the other. Ripens from August 8 to 25.

Hulled nut.—Size medium (average, $1\frac{1}{2}$ by $\frac{7}{8}$ by $\frac{5}{8}$ inches); number of nuts to the pound, 130 to 150. Percentage of kernel to nut in hand-cracked samples, 25.

Shape: Rather flat, long, oblong-ovate. Axis very close to dorsal edge. Ventral edge very gently curved in middle, much curved at base and apex; flange and wing thick and very prominent; wide shallow depression on ventral edge to one side of wing and parallel to it, most pronounced near base. Dorsal edge nearly straight; dorsal ridge lacks prominence. Base truncate; dorsal shoulder slopes suddenly from edge of stem scar; ventral shoulder somewhat truncate, curving sharply at a considerable distance from stem scar; stem scar large, wide oval, at right angles to axis or slightly sloping either ventrally or dorsally. Apex somewhat truncate, broad, somewhat broadly rounding.

Shell: Hard; outer surface a very light grayish brown in color. Outer shell thick and hard. Pits medium in number, small to medium in size, mostly round, variable in depth. Deep, short, oblique grooves on ventral edge. Fine short deep grooves at base. Canals numerous, large, oval. Network of fibers coarse, fibers large. Inner shell thick, hard, inner surface covered with shallow corrugations, very light brown in color. Ventral ridge light brown in color, short to medium in length, very narrow, base end acuminate.

Kernel: Size, average medium (1 by $\frac{1}{2}$ by $\frac{3}{8}$ inch). A considerable number of doubles. Shape long oval, medium plump; dorsal edge straight, ventral edge curved throughout the entire length. Base plump, rounded; apex blunt with ventral edge much curved. Pellicle very light brown, covered with long, fine pubescence; pellicle fold very large, on apex half of ventral edge; base scar, small, round, light brown. Flavor fair; trace of bitter.

Distinguishing characteristics.—Nut very long, oblong-oval; ventral edge gently curved in middle, sharply curved at base and apex, flange thick and prominent; dorsal edge straight; base and apex wide and truncate, stem scar at right angles to axis or slightly sloping either ventrally or dorsally; kernel long oval, trace of bitter; outer and inner surface of shell and pellicle of kernel very light in color.

COMMENTS

This variety is worthless for planting, because of the small percentage of kernel to the shell.

11. CARTAGENA (FRENCH LANGUEDOC)

Origin.—Imported into this country from Spain. A number of orchards of this variety are found in California, most of them being in the Sacramento district, while some are in the Lodi and Oakley districts. The channels through which the variety was introduced into this country are not known to a certainty.

Description

TREE

Upright. Resembles the Languedoc quite closely. Bears on spurs on wood 2 to 4 years old. Foliage of medium density.

NUT

Hulled nut.—(Pl. III, *A*.) Size variable, average medium (1⅜ by ⅞ by ⅝ inches), number of nuts to the pound, 140 to 160. Percentage of kernel to nut in hand-cracked samples, 30 to 35.

Shape: Quite plump, especially at base; pointed ovate; edgewise view, ovate-elliptical or cuneiform-ovate. Ventral edge plump, sharply and evenly curved, most sharply curved at base; longitudinal depressions common; wing and flange usually thick and bluntly tapering, being thick near nut and thin on edge; wing varies much in thickness, as well as in prominence. Dorsal edge gently curving; dorsal ridge narrow to medium, prominent or not prominent. Base plump, bluntly round; stem scar medium in size, but variable, at right angles to axis, or sloping slightly either ventrally or dorsally. Apex pointed, the bluntness of point variable; usually plump with tendency to narrow at extreme tip.

Shell: Hard, bony in texture, thick; outer surface usually dark brown. Pits large, moderate in number. Outer surface between pits smooth or stippled. Grooves run outward from base, and grooves of varying depth and number appear on the surface of the shell. Inner surface light brown in color, wavy, frequently with very long, shallow, longitudinal depressions. Canals very large.

Kernel: Medium to large in size (1⅛ by 1 by ½ inches); frequently does not fill entire shell cavity. Shape variable, long oval, or ovate. Ventral edge usually much curved, but sharpness of curve varies. Dorsal edge straight or slightly curving. Ventral edge frequently same length as dorsal. Base rounding and usually quite thick; dorsal shoulder generally square; ventral shoulder round and sloping. Apex pointed, bluntness of point variable. Pellicle rich brown, thick, pubescent; veins dark brown; pellicle fold rather small, on apex half of ventral edge; base scar dark brown, rather small, round or oval, sometimes indistinct. Flavor fair.

Distinguishing characteristics.—This nut belongs to the group including the Brown, Concord, Fairoaks, Golden State, Rice, Routier, and a number of unnamed California seedlings and is, therefore, difficult to distinguish. The following combinations of points are helpful: Shape generally pointed ovate, but somewhat variable; ventral edge sharply curved, especially near base, and with longitudinal ridges and wide depressions parallel to wing; dorsal edge gently curved, at apex sharply curved either inward or outward; base generally finely grooved, base scar varies in slope, i. e., at right angles to axis or sloping gently either ventrally or dorsally; ventral flange medium in prominence but variable; shell thick, very dark brown, with short grooves on surface varying in number and depth; kernel often with depression in side.

This variety is distinguished from others in the group by the long ridges on the ventral edge and by the depression often found in the side of the kernel.

COMMENTS

Most of the Cartagena trees grown in California were planted in frosty localities, where they proved unproductive; many of them have been removed in recent years. It is one of the inferior varieties.

12. CATAMERA (ALMENDRONE)

Origin.—Introduced from Catamera, Spain, by D. G. Fairchild, of the United States Department of Agriculture, in 1901. In Spain the name is applied to several seedling varieties. A few scions were distributed to parts of the Sacramento Valley, California, by the United States Plant Introduction Garden at Chico. Only a few trees still remain. It should be noted that the nuts described vary in shape.

Description

NUT

Immature nut.—Pubescence on hull usually abundant.

Hulled nut.—Usually small (1¼ by ¾ by ½ to ⅝ by ⅜ by ½ inches), hard-shell almonds. Number of nuts to the pound, about 125. Percentage of kernel to nut in hand-cracked samples, 15 to 20.

Shape: Varies somewhat; moderately plump. Widest portion of nut one-fourth to one-third the distance from base to apex. Ventral edge usually with flange running its whole length; flange not prominent, sometimes merely suggested. Dorsal edge with ridge only slightly elevated. Base plump; both shoulders plump and sharply rounded; base scar medium size, oval, at right angles to axis or very gently sloping, usually dorsally, but sometimes ventrally. Apex sharply rounded, with mucronate point.

Shell: Very hard. No distinction in hardness between outer and inner shell. Outer surface, light brown. Pits medium in number, small, deep. Inner surface of shell smooth. Ventral streak long, dark, wide.

Kernel: Medium plump; long. Shape variable. Size rather small to medium (¾ by 5/16 by ½ inch). Ventral edge curved. Dorsal edge only slightly curved. Quality inferior.

Distinguishing characteristics.—On account of the variation in the shape of the nuts, they are difficult to distinguish from other varieties. The Catamera nuts are always small and very hard shelled. The flange runs the entire length of the ventral edge and is never prominent. The color of the inner surface of the shell is light brown; the pits are small and deep; and the ventral streak is wide. The kernel is plump, but the shape varies. Percentage of kernel to shell is only 12 to 20.

COMMENTS

The nut is too small and the shell is too hard to be of value.

13. COMMERCIAL

Origin.—Originated on the A. M. Newland ranch, near Colusa, Calif. A considerable number of the trees were grown near Colusa. The name was given the variety by buyers prior to 1890 and has been used locally ever since. The name " Commercial " has been used incorrectly in many sections to designate the Harriott. The nuts sometimes come into the market as Ne Plus Ultra.

Description

TREE

Upright (ratio of width to height of head, 1:1¼), large, vigorous grower. Trunk moderately stocky; bark rough, exfoliates in thick flakes.

Main branches.—Quite vigorous in growth, usually stocky. Branching angle acute. Bark dull reddish gray; rough on old branches.

Twigs.—Rather stocky, medium in length. Branching angle acute. Nodes medium in size. Internodes medium in length (½ to 1½ inches). Bark dull green, tinged with brownish red in autumn.

Lenticels.—Numerous; raised; usually narrow and long, but vary much in shape and size. Apexes usually acute, but sometimes very blunt.

Foliage.—Seldom dense. Leaves vary much in manner of curling up and in twist of petiole.

Blade: Variable in size; generally medium to rather small (average, 1 by 3 inches; ratio of width to length of blade, about 1:3). Shape elliptical or ovate. Base acute to obtuse; origin of margins commonly symmetrical. Apex quite bluntly acute. Margin sharply crenate, but frequently serrate near base and apex of blade; bristle wide. Basal crenation, or sometimes two basal crenations, glandular. Glands two to four, often three, globular, green, or light brownish green late in season.

NUT

Immature nut.—Size medium (1¾ by 1⅛ by ¾ inches). Shape plump, oval. Ventral edge curves most at base and apex; suture a distinct line. Dorsal edge straight, curving most at apex.

Hull: Outer surface green, with patches of reddish brown late in season; pubescence abundant, coarse, gray, woolly. Inner surface pale green as dehiscence starts, rapidly turning brown. Dehisces along ventral edge. Ventral edges of halves of hull curved inward except at immediate base. One half of hull generally dries faster than the other. Ripens from August 15 to September 10.

Hulled nut.—(Pl. III, *B.*) Size medium ($1\frac{1}{2}$ by $\frac{7}{8}$ by $\frac{5}{8}$ inches). Number of nuts to the pound, 170 to 220. Percentage of kernel to nut in hand-cracked samples, 38.

Shape: Long ovate-oval. Part on ventral side of axis long ovate. Edgewise view, ovate-oval. Ventral edge much curved, straighter at apex than elsewhere. Wing thin and prominent the entire length of ventral edge. Dorsal edge considerably curved; plump; dorsal ridge narrow, not prominent, except at shoulder. Base usually plump, flat; stem scar medium in size, narrow, long, slightly sloping dorsally or at right angles to axis. Apex wide, blunt; wing ends in broad tip.

Shell: Soft, very light brown in color; outer surface thin, porous, and crumbly. Pits medium to numerous, small to large, variable in shape, mostly round; on sides and dorsal edge clear to ridge. Surface between pits deeply and coarsely stippled. Canals medium in size, oval. Inner shell, thin, hard. Inner surface light brown, with deep, short undulations. Ventral streak dark brown, short, narrow, tapering from middle to base; base end usually blunt.

Kernel: Seldom fills shell cavity. Very few doubles. Size medium to quite large (average, 1 by $\frac{3}{4}$ by $\frac{1}{2}$ inch). Ovate; dorsal edge more straight than ventral edge as a rule. Ventral edge inclined to be straight at apex. Dorsal shoulder square or sharply rounding. Ventral shoulder gently rounding. Apex thin, wide, slightly tapering. Pellicle medium dark brown; pubescence short and very rough; veins indistinct; pellicle fold small, on apex third of ventral edge. Base scar dark brown, large, prominent, oval, or ovate. Flavor sweet, fair.

Distinguishing characteristics.—Shape long ovate-oval; wing thin and prominent; apex wide; base slightly dorsally sloping or at right angles to axis; pits medium in number; outer shell porous and crumbly; base of ventral streak blunt; kernel oval; pellicle light brown with heavy pubescence. Nuts of this variety often come into the market as Ne Plus Ultra, from which they can be distinguished easily. The shell is much lighter in color, is much more crumbly, has fewer pits; the wing is more evenly prominent; the dorsal edge is straighter; and the stem scar is slightly dorsally sloping or at right angles to the axis, while in the Ne Plus Ultra the stem scar is slightly ventrally sloping or at right angles to the axis. The nut of the Commercial is much smaller, the kernel sweeter, and the pellicle is lighter in color and less pubescent than is the case in the Ne Plus Ultra.

COMMENTS

On account of the light bearing habit of the tree, small size of the nut and kernel, and the tendency of the shell to crumble the variety should not be planted commercially. Mr. Newland, the originator of this nut, has not recommended it for several years, because he considers it inferior to a number of other varieties.

14. CONCORD

Origin.—Uncertain. Grown in the Concord district.

Description

NUT

Hulled nut.—(Pl. III, *C.*) Size large ($1\frac{5}{8}$ by $1\frac{1}{16}$ by $\frac{5}{8}$ inches). Number of nuts to the pound, 95 to 125. Percentage of kernel to nut, hand cracked, 27.

Shape: Moderately plump, medium long, rather narrow pointed oval. Widest at one-third of distance from base to apex. Axis a little over one-third of way from dorsal to ventral edge, i. e., nearer dorsal edge than ventral. Edgewise view distinctly oval with cuneiform apex, point truncate. Ventral edge gradually curving near middle, abruptly curving near apex, and increasing in curve from middle to apex, ventral flange thick and slightly protruding; wing distinct, but never very prominent; suture frequently visible near base. Dorsal edge gently curving, with short, sharp incurve at apex; ridge slight, suture line visible at base. Base somewhat flat, medium wide; dorsal shoulder square, but not prominent; ventral shoulder sharply rounding; stem scar rather large, long, oval, at right angles to axis or sloping slightly ventrally, sometimes dorsally. Apex pointed, tip sharp; wing visible at apex; usually small, crack-like depressions are present on both sides of the wing at extreme apex of the nut, giving it a three-pointed appearance when viewed from the dorsal edge, and when the depressions are absent a dorsal view of the apex shows it to be rather blunt with one side projecting slightly farther than the other.

Shell: Very hard and thick. Outer shell very thick, compact, hard. Outer surface, light to dark brown, with varying number of short, irregular grooves. Canals large. Pits vary in number, size, and shape, but are usually larger and more numerous near apex than elsewhere. Surface between pits usually smooth, but sometimes stippled. Grooved heavily at ventral edge, grooves usually short and deep. Fine grooves at base. Dorsal edge with pits and short grooves. Inner shell thick and inner surface dark brown, undulating. Ventral streak medium in length, wide, darker in color than rest of inner surface; frequently lighter in color at apex than at base.

Kernel: A few doubles (5 per cent). Size, medium to quite large (average 1 by $\frac{1}{2}$ by $\frac{5}{16}$ inch), fills shell fairly well, but shrinks considerably when drying. Shape medium plump, ovate, sides gently curved. Base usually round; sometimes ventral shoulder slopes more than dorsal. Apex bluntly pointed. Pellicle dark brown, heavily pubescent; veins numerous, small. Flavor insipid, slightly sweet, poor.

Distinguishing characteristics.—The nuts of this variety are shaped very much like the Cartagena and belong to the group including the Brown, Cartagena, Fairoaks, Golden State, Rice, Routier, and several unnamed California seedlings. The Concord can be distinguished from practically all the other varieties by the extreme apex, which is very thick and truncate when viewed dorsally, and generally two marked depressions each side of the wing give the apex a three-lobed appearance in dorsal view; furthermore, the ventral edge has numerous oblique and very deep short grooves, which is not the case in other varieties of this class. The pubescence on the kernel is very coarse and abundant.

COMMENTS

One of the poorest of all varieties. Its hard shell, poor flavor, and coarse appearance condemn it. Fortunately, the variety is not extensively grown.

15. COVER

Origin.—A seedling variety originated on the J. A. Cover ranch, near Modesto, Calif. Mr. Cover believes it to be a cross of the Jordan and Ne Plus Ultra. He has propagated trees of the variety on his ranch since 1915.

Description

TREE

Upright (ratio of width of head to height, 3:4); moderately vigorous grower like the Rock type of Jordan. Trunk tends to grow rather slender and straight; bark rough.

Main branches.—Long, straight, upright. Branching angle acute. Wood tough. Bark smooth on young wood except for small knots and raised lenticels.

Twigs.—Very numerous, short, rigid. Branching angle acute. Wood tough. Nodes fairly large. Internodes rather short ($\frac{1}{2}$ to $\frac{3}{4}$ inch). Bark tough, bright green even late in autumn.

Lenticels.—Very numerous; evenly distributed; much raised; gray; wide oval; ends acute; size on 4 to 6 year-old wood, $\frac{1}{32}$ by $\frac{3}{16}$ to $\frac{3}{16}$ by $\frac{1}{4}$ inch.

Foliage.—Dense. Stays on tree late in fall.

Blade: Rather small (average, $\frac{7}{8}$ by $2\frac{3}{4}$ inches, ratio of width to length, about 1:3). Leaves vary in width. Shape varies, ovate or elliptical. Base obtuse and rounded; origin of sides mostly unsymmetrical. Apex bluntly acute, margins curve outward and bulge in middle, crenate, frequently doubly crenate; crenations short, wide, with long bristle. Upper surface, smooth, light green. Lower surface lighter in color than upper. Blade flat with tendency to curl at apex.

Petiole: Short ($\frac{5}{8}$ inch, ratio of length of petiole to length of blade, 1:4 or 1:5); slender. Pale green in color. Groove on upper surface narrow, deep green. Glands two to four, round, gray green or brownish, near base of petiole.

Bearing habit.—Mostly on spurs on wood 2 and 3 years old. Spurs medium in stockiness ($\frac{1}{8}$ inch) and length ($\frac{1}{4}$ inch); expands gradually to wide oval disk $\frac{5}{32}$ by $\frac{3}{16}$ inch. Buds free, pointed.

NUT

Immature nut.—Usually dehisces along ventral suture only, although frequently dorsal edge dehisces. Hull curls much in dehiscing. Pubescence abundant. Ripens in September.

Hulled nut.—(Pl. III, *E.*) Size, small to medium (average, $1\frac{1}{2}$ by $\frac{3}{4}$ by $\frac{5}{8}$ inches), number of nuts to the pound, 200 to 250. Percentage of kernel to nut in hand-cracked samples, 56.

Shape: Plump, long oval, tapering at both ends. Edgewise view, long oval. Ventral edge curved gently in middle and more sharply at ends; wing thin, medium in prominence, usually most prominent near apex; shallow depression along one side of wing, making one side more prominent than the other. Dorsal edge curved considerably, especially at base and apex; dorsal ridge frequently depressed. Base tapering, constricted; dorsal shoulder higher than ventral, sloping suddenly from edge of stem scar; ventral shoulder much sloping, gently curved, base scar medium in size, nearly round, much ventrally sloping. Apex bluntly pointed, wing ending in sharp point.

Shell: Soft paper shell; color medium light, yellowish brown, varying somewhat. Pits medium in number, rather large, variable in depth. Outer shell quite thin, porous, and brittle. Canals medium in size, oval. Fibers fine to medium. Inner shell thin, hard. Inner surface varies from light to dark brown, darker than outer surface. Ventral streak dark brown, short, wide, base end wide and blunt or truncate.

Kernel: Large for size of nut (average, $1\frac{1}{8}$ by $\frac{1}{2}$ by $\frac{3}{8}$ inches). A few doubles (2 per cent). Plump; very narrow and long oval, pointed at both ends. Ventral edge curved more than dorsal. Dorsal shoulder much above base scar, ending in a sharply rounding point. Ventral shoulder sloping. Apex bluntly pointed. Pellicle thin, tender, light to rich medium dark brown, quite smooth except for small amount of very short pubescence at apex; veins distinct or indistinct, fold medium in size on apex third of ventral edge; base scar dark brown, large, prominent, wide oval. Flavor very slightly sweet, pleasant, good.

Distinguishing characteristics.—Nut long oval, plump, both ends pointed; stem scar ventrally sloping; kernel very long, narrow, oval, plump, dorsal shoulder ending in sharply rounding point, pellicle smooth.

The nut resembles the Eureka somewhat, but the base is less pointed, the stem scar slopes ventrally, and the dorsal edge curves outward at the apex, while in the Eureka it tends to be straight or recurved. The nut on the whole is coarser than the Eureka.

COMMENTS

The soft shell and bright, plump, smooth, large, attractive kernels are points in favor of this variety. The nut matures very late. Trees of this variety have not been in bearing long enough to make it possible to determine their bearing habit, regularity of production, or thriftiness when they reach middle age. The variety has not been distributed commercially.

16. CROWN

Origin.—In 1904 J. A. Cover, of Modesto, Calif., purchased a considerable quantity of nursery stock which he planted on his ranch. One of the trees turned out to be different from any of the others and was propagated under the name "Crown." Grown mostly in the Modesto-Oakdale section.

Description

TREE

Medium vigorous, spreading, drooping (ratio of height to width of head, 1:$1\frac{1}{4}$). Top round, very scraggy, much more so than in Drake. Trunk inclined to grow stocky and crooked; bark rough with deep cracks.

Main branches.—Tend to originate in whorls on all ages of wood; stocky, short, crooked, zigzag. Branching angle very obtuse (approaching a right angle). Bark on 6-year-old wood or younger very smooth except for knots; yellowish red.

Twigs.—Numerous, giving tree a brushy appearance; medium in length, rather stocky, rigid. Branching angle obtuse. Wood tough, bark brittle, with heavy gray bloom. Nodes exceedingly small. Internodes medium in length (½ to 1¼ inches).

Lenticels.—Very numerous; rather evenly distributed, long, narrow; much raised, gray, rough. Apexes obtusely pointed. Sides have a tendency near middle to be straight rather than curving. (Size on bark 5 and 6 years old, $\frac{1}{32}$ by ¼ to $\frac{3}{32}$ by ½ inch.) On young wood lenticels short, oval. On twigs, lenticels numerous, small, round, grayish green. (See Pl. XVII, *A*.)

Foliage.—Dense. Leaves very numerous, remain on the tree late in fall. Many borne in clusters. Leaves curve upward from midrib to margin, edges seldom wrinkled.

Blade: Small (¾ by 2¼ inches), wide, and short (ratio of width to length, 1:3). Shape ovate-elliptical. Base obtuse, sharply curved; origin of sides symmetrical or nearly so. Apex bluntly acute, with margins curving gently outward. Margins gently curved, seldom wrinkled, widely crenate; bristles short, wide. Blade thick. Upper surface smooth and glossy. Lower surface lighter green than upper. Midrib light in color; medium in prominence. Veins very distinct.

Petiole: Short (½ inch, ratio of length of petiole to length of blade, about 2:9), rigid, stocky; groove shallow; upper surface tinged with red in late summer.

Bearing habit.—Distinctly an alternate bearer. Bears on spurs, mostly on 2-year-old wood, some on 3-year-old wood. Many spurs compound, living one year only, although frequently producing a new leaf shoot the second year. Spurs slender ($\frac{3}{32}$ inch), long (1¼ to ⅜ inches); expands gradually to small, wide oval disk $\frac{5}{32}$ by ⅜ inch. Leaf buds distinctly appressed.

NUT

Hulled nut.—(Pl. III, *D*.) Variable in size, average medium (1½ by ⅞ by ⅝ inches). Number of nuts to the pound, 130 to 150. Percentage of kernel to nut in hand-cracked samples, 44.

Shape: Irregular ovate; viewed edgewise, long oval with sides curving outward clear to tip, tip frequently bulging. Ventral edge gently curving on base half, gradually increasing in curve until apex is reached, curve varies somewhat, but at apex edge of wing approaches axis at very obtuse angle. Longitudinal depression and ridge present. Wing rather thick, medium in prominence, ending in short sharp tip at apex. Dorsal edge straight or gently curving, curves inward at apex; dorsal ridge broad and marked with short longitudinally arranged parallel lines. Base somewhat constricted, narrowly truncate or slightly dished, sloping dorsally; dorsal shoulder rather square; ventral shoulder rounding; stem scar wide and large, gently sloping dorsally. Apex plump, ending in a sharp point, strikingly scimitar shaped.

Shell: Light to dark brown in color, often golden brown; color varies much, according to type of soil upon which tree is grown; semisoft, some hard to break with fingers. Outer shell brittle and crumbly. Pits numerous, large to medium, varying in depth on same nut. Part of shell between pits coarsely stippled. Base end fluted with many ridges. Short, deep, wide grooves on ventral edge oblique to wing. Canals medium in size. Network of fibers coarse. Fibers large. Inner shell medium in thickness and very hard. Inner surface light brown in color with short and rather deep undulations. Ventral streak distinctive; dark brown in color, long, very wide, and cuneiform in shape, widening from the very tip to the base (seldom gets narrower from middle to base); base end very blunt and not clear cut, but rather ragged in appearance; sides not sharp, but gradually merging with the lighter brown of the inner shell; surface rough, appearing like fine sandpaper.

Kernel: Rather small to medium (1 by ½ by ⅜ inch). Very many doubles (83 per cent). Plump, narrow oval or slightly ovate. Ventral edge thick and gently curved, dorsal edge quite thick and gently curved. Base plump, usually rounding. Apex obtuse with very short, wide point. Pellicle dark brown, covered thickly with fine, short pubescence; veins indistinct; pellicle fold on upper third of nut. Flavor dry, neutral, very slightly sweet, mediocre.

Distinguishing characteristics.—Nut irregular ovate; base constricted; apex decidedly scimitar shaped, sharp pointed; ventral streak cuneiform, widening gradually from apex to base, base round. Kernels mostly doubles, long, with short fine pubescence.

In shape the Crown somewhat resembles Barclay, Philopena, O'Neil, and Silvershell. It is easily distinguished from these by the scimitar-shaped apex.

COMMENTS

The tree is so brushy that it is kept in shape with difficulty. An alternate bearer, therefore unprofitable. Difficult to harvest because nuts ripen very unevenly. Ripens from August 10 to September 10. Most of the nuts are doubles, very irregular in size, and of poor flavor. Of little value.

17. DE WITT (DE WITT'S SEEDLING)

Origin.—A seedling tree appeared on the De Witt ranch, Sutter, Calif., in 1906. At one time it was thought that the variety might be an improvement over the Jordan types. It is not grown commercially.

Description

TREE

Rather upright, top somewhat scraggly. Medium in vigor. Trunk inclined to be slender; bark rough.

Main branches.—Rather stocky, medium in length with short, irregular depressions. Branching angle quite wide in crotches, but branches tend to curve toward each other. Wood brittle, with many knots. Bark rough on old branches, dark reddish brown, with small amount of thin gray epidermis, exfoliates in small, very thin flakes; younger branches delicately striated.

Twigs.—Medium in length, stocky, rather rigid. Branching angle moderately acute; branches tend to curve together. Nodes large; internodes short (average $\frac{1}{2}$ inch). Bark, light green, reddish in fall.

Lenticels.—Rather few, tend to vary in number, and occur in patches; ash gray; rather large (on 8 to 10 year-old wood $\frac{1}{16}$ by $\frac{3}{16}$ by $\frac{3}{32}$ by $\frac{3}{8}$ inch), wide-elliptical. Apexes bluntly acute; sides curving. Slightly raised on old bark; frequently level with surface of bark on young wood, on young bark few but conspicuous. (Pl. XVI, *B.*)

Foliage.—Medium dense and retained quite late in fall, light green.

Blade: Small to medium ($\frac{5}{8}$ by $2\frac{1}{4}$ to $1\frac{1}{2}$ by $3\frac{3}{4}$ inches); average ratio of width to length about 2:7. Shape elliptical-ovate. Base widely acute, origin of margins usually unsymmetrical. Apex long, tapering, acute. Margins crenate or doubly crenate. Main rib slender, quite prominent. Veins distinct, slightly raised on lower surface. Upper surface glossy, medium light green; lower surface dull green.

Petiole: Medium in length ($\frac{3}{4}$ inch; ratio of length of petiole to length of blade, about 1:4); slender, light green, frequently tinged with red in late summer. Groove medium width; usually deep. Glands two to six, commonly three or four, small, globular, dark yellow or brownish red.

Bearing habit.—On wood 2 to 4 years old. Nuts in clusters. Spurs medium in stockiness ($\frac{1}{8}$ inch) and length ($\frac{1}{4}$ inch); expands gradually to oval disk $\frac{3}{16}$ by $\frac{1}{4}$ inch. Nuts drop from branches so readily that when ripe they fall before they are knocked.

NUT

Immature nut.—Large (2 by $1\frac{1}{2}$ by $1\frac{1}{8}$ inches). Ovate. Ventral edge much more curved than dorsal; ventral ridge wide ($\frac{3}{16}$ inch), prominent ($\frac{1}{16}$ inch high or more); suture depression $\frac{3}{32}$ inch wide, $\frac{1}{16}$ inch deep. Dorsal edge gently curved. Base rather flat and round. Ventral shoulder much rounded. Apex round or slightly tapering; rudiment small.

Hull: Outer surface green, retains color a long time when dehiscing; wrinkles and shrinks much on dehiscing; color finally becomes grayish green. Inner surface changes rapidly from green to a rich brown as dehiscence proceeds. Thickness of hull one-eighth or one-fourth that of nut. Dehisces on ventral edge first, then cracks on dorsal edge at apex and base; halves of hull may or may not be completely divided, frequently remain attached to each other by narrow strip of hull at apex, letting loose of twig at base. Ventral edges curve outward at base and inward at apex. Hull dries down much, soon exposing a good deal of the surface of the nut. Ripens early in September.

Hulled nut.—(Pl. IV, *A.*) Size large. (Average, 1 7/8 by 1 1/8 by 5/8 inches.) Number of nuts to the pound, 85 to 100.

Shape: Oval-ovate; ventral edge curved sharply at apex and base. Flange very thick, prominent; frequently cracks appear each side of wing, dividing the flange lengthwise into three parts. Wing thick and prominent. Long shallow depressions on both sides of flange with slight ridge outside of each depression paralleling it. Depressions deepest at base. Dorsal edge curved much less than ventral, curving sharply at apex, and frequently slightly recurved at extreme apex. Dorsal ridge thick and medium prominent. Base quite wide. Dorsal shoulder rather small, quite square but not prominent, dropping off suddenly at a short distance from edge of stem scar. Ventral shoulder rounded, slightly depressed each side of wing, due to the increase in depth of longitudinal depressions. Base slightly corrugated. Stem scar large, long, narrow-oval, at right angles to axis or very slightly sloping, either ventrally or dorsally. Apex flat, wide, blunt, although frequently extreme tip is pointed.

Shell: Hard; outer surface an attractive light brown. Outer shell quite thick, very hard, but brittle. Pits few, large, deep, mostly round. Surface between pits smooth. Canals numerous, medium large, generally round. Network of fibers fine. Fibers rather small. Inner shell thick and hard. Inner surface light brown, with many short undulations. Ventral streak light brown, but darker than rest of inner surface, short, wide, tapering abruptly at base end.

Kernel: Large (average, 1 1/4 by 5/8 by 3/8 inches). Doubles seldom. Percentage of kernel to nut, 20. Flat, long, ovate-oval. Ventral edge curved more than dorsal. Base round, apex bluntly pointed. Pellicle dark brown; heavily covered with very coarse pubescence of medium length; veins indistinct; pellicle fold rather pronounced on apex half of ventral edge; base scar small, dark brown, inconspicuous, generally round. Flavor very sweet, pleasant, good.

Distinguishing characteristics.—This nut is in the Jordan class, resembling the Malaguena Jordan. It is distinguished from the latter by the wider and shorter shape, by the less tapering apex, and by the greater prominence of the flange and wing. The kernel is sweeter and has a little more pubescence on the pellicle.

COMMENTS

Although the kernel is of excellent flavor and is large in size, the large proportion of shell to kernel and the hard shell prohibit this nut from becoming of commercial importance.

18. DIXIE

Origin.—At one time grown in southern Utah. Probably a seedling. Origin vague.

Description

Hulled nut.—Size small to medium (average, 1 1/4 by 1 by 5/8 inches).

Shape: Ventral edge much curved; wing thick, but not prominent. Dorsal edge straight. Base truncate, sloping dorsally. Apex truncate, wide, or bluntly rounding, with an exceedingly short tip where wing ends.

Shell: Color light brown. Pits round, medium size, deep. Outer shell thin. Canals small. Network of fibers fine, fibers very coarse. Inner shell thick and hard. Inner surface light brown, smooth. Ventral streak dark brown, medium in width, tapering gradually from middle to apex.

Kernel: Medium in size (1 by 9/16 by 5/16 inch). Rather oval in shape when viewed flatwise. Ovate cuneiform in edgewise view. Kernel fairly plump. Dorsal and ventral edges gradually curved. Dorsal edge thin. Ventral edge thick. Dorsal shoulder sloping. Ventral shoulder sharply rounding. Apex bluntly rounding. Pellicle tough; pubescence very abundant, very coarse, long; pellicle fold heavy, extending from one-half to two-thirds the way up apex to base. Flavor neutral and poor.

Distinguishing characteristics.—When seen with other nuts it helps in distinguishing it to note that the outer shell is thin, the inner shell is comparatively thick, the base slopes dorsally, the apex is truncate, and the oval kernel is very pubescent.

COMMENTS

The variety is of no value.

19. DRAKE

Origin.—H. C. Drake, of Suisun, Calif., had a nectarine tree budded on almond stock. The top of the tree broke off, and a sprout grew up from the almond root which bore so well that it attracted attention. Trees were budded to the variety, and by 1880 the variety was being distributed. It was soon widely planted. It is now one of the most extensively grown varieties of almonds in California, being found in every almond-growing district.

Description

TREE

Moderately vigorous. Very spreading (ratio of height of head to width, 1:1½), bushy, scraggly, with lower branches drooping. Trunk medium in stockiness; bark rough with longitudinal cracks close together, exfoliates in small flakes.

Main branches.—Short, stocky, tend to grow horizontal, scraggly, very zigzag. Branching angle wide (almost right angles). Wood hard, brittle. Bark rough except on young branches (rougher than in most varieties); exfoliates in small flakes; under bark deep cherry red, but this color is frequently obscured by thick, gray, exfoliating epidermis; young branches frequently gray.

Twigs.—Many young twigs. Tend to be vigorous, medium long, stocky. Wood rather brittle. Nodes large. Internodes rather short (⅜ to 1 inch). Bark green with considerable bloom, frequently tinged with red in the fall. The pith in this variety is frequently brownish.

Lenticels.—Variable. Usually numerous, large (size on bark 8 to 10 years old $\frac{1}{16}$ by $\frac{3}{16}$ to ⅛ by ½ inch), wide, short, rough, raised, gray. Elliptical on old bark, oval on young bark. Ends usually bluntly acute but often short acuminate. On bark 2 to 4 years old the lenticels are numerous, gray, generally conspicuous, ends usually blunt and round.

Foliage.—Dense. Leaves medium in size, but there are also many small young leaves present; tend to remain flat or to recurve slightly.

Blade: Size small to large (⅝ by 2¼ to 1¼ by 4 inches, average medium, ⅞ by 3¼ inches; ratio of width to length, about 2:7). Shape ovate or elliptical-ovate. Widest part usually near middle. Base usually obtuse, frequently rounding, origin of sides generally unsymmetrical on mature leaves, but sometimes symmetrical. Tendency for apex half of leaf to taper, apex acute to acuminate. Margin deeply and shortly crenate. Midrib medium in size, medium prominent, pale, grayish green in color. Veins distinct, prominent, elevated on lower surface. Blade thick. Upper surface rather light, deep green. Lower surface a very little lighter in color than upper, but darker than in most varieties.

Petiole: Rather long (average, ⅞ inch; ratio of length of petiole to length of blade about 2:7); varies in stockiness, averages stocky, rather rigid. Lower surface pale light green, tinged with red in late summer. Groove varies in width and depth but averages deep and rather narrow. Glands two to six, generally three, commonly two or four, usually on petiole; vary in size from small to large, oval, yellowish, or brownish.

Bearing habit.—The variety is a heavy but somewhat of an alternate bearer. On spurs on wood 1 to 4 years old, also on laterals. Spurs having clusters of three or more nuts are common. Sometimes spurs of the preceding year produce vegetative growth from bud. Spurs frequently live two years and sometimes three. Some compound spurs, long (½ to 3 inches) and ¼ to ⅜ inch in diameter. Many of the single spurs are short and thick, but vary much in this regard, average medium to long (¼ to ½ inch) and medium in stockiness (⅛ inch). Old spurs shrink much in diameter. Spurs expand gradually from middle to wide oval disk $\frac{3}{16}$ by ¼ inch. Buds free, large, plump in middle, constricted at base, medium length, bluntly pointed; scales dark brown, medium in size, rather thick and hard, with much gray pubescence on edges.

NUT

Immature nut.—Size medium (average, 1⅜ by 1⅛ by 1 inches). Shape plump, irregular ovate; part on ventral side of axis ovate, part on dorsal side oblong. Ventral edge very much curved, bulging and curving most sharply at middle, curving slight from middle to apex. Dorsal shoulder rather straight from bulge on ventral edge to near base scar. Ridge lacking. Frequently side of hull to one side of suture is more prominent than the other. Ventral suture depression wide ($\frac{3}{8}$ inch), quite deep ($\frac{1}{32}$ inch), deepest along base half. Dorsal edge very gently curved, curving most at apex. Base tapering, sloping dorsally; very short grooves at base; stem cavity $\frac{1}{4}$ by $\frac{3}{8}$ inch in area, shallow ($\frac{1}{32}$ inch). Apex pointed ovate, with rather straight ventral edge; short depression to dorsal side of rudiment; style stays on quite long.

Hull: Outer surface of hull green and smooth (i. e., no marked depressions); pubescence abundant, thick, medium long, medium fine, felty, gray. Usually dehisces on ventral edges only. Sometimes apex or dorsal edge cracks slightly. Ripens from September 5 to 30, according to locality and season.

Hulled nut.—(Pl. IV, *B*.) Size small to medium (1 by $\frac{13}{16}$ by $\frac{5}{8}$ to $1\frac{1}{2}$ by $\frac{15}{16}$ by $\frac{11}{16}$ inches). Number of nuts to the pound, 130 to 220. Percentage of kernel in hand-cracked samples, 35 to 40; in machine-cracked run, 36.5.

Shape: Plump, very wide in proportion to length; very broad round-ovate, sometimes round oval. Viewed edgewise wide oval, sides symmetrical or unsymmetrical. Ventral edge sharply curving, outline almost circular; thick and blunt; wing thick, distinct, but not prominent. Dorsal edge curved much less than ventral, gently curving, curving most at apex, very plump, dorsal ridge wide and only slightly elevated, most prominent at base; coarse fiber entire length of dorsal ridge. Base plump; stem scar medium to large, wide in proportion to length, gently sloping dorsally, seldom at right angles to axis. Apex blunt, round, and thick, ending in blunt point.

Shell: Outer shell thick, varies in texture, generally spongy and somewhat crumbly, usually light brown in color. Pits numerous, small, round, surface between coarsely stippled. Base end grooved with short, fine grooves. Grooves along ventral edge running at wide angles to the wing. Canals and fibers medium size. Inner shell medium thick and hard, sometimes so hard as to make it difficult to crack nuts with fingers. Inner surface of inner shell light rich brown in color. Surface very slightly undulating. Ventral streak, dark brown, medium to long, medium in width, acute at apex, broad and round at base.

Kernel: Small to medium (average, $\frac{7}{8}$ by $\frac{9}{16}$ by $\frac{3}{8}$ inch). Some doubles (5 per cent). Rather large, plump, ovate, nearly fills shell cavity. (Viewed edgewise kernel is ovate or ovate-oval.) Ventral edge gently curving and thick. Dorsal edge usually a little longer and a little more curving than ventral. Base plump; dorsal shoulder sharply round or slightly square; ventral shoulder round but sloping. Apex plump, usually round, but sometimes acute. Pellicle rich light brown, thin; with very short, fine pubescence, sometimes appearing almost smooth; veining distinct, veins usually large, dark brown in color; pellicle fold heavy and covered with more pubescence than rest of pellicle, on apex half of ventral edge. Flavor rather poor, slightly sweet, dry.

Distinguishing characteristics.—Shape of nut rather wide, quite plump; round-ovate; ventral edge sharply curved, most curved near base; dorsal edge considerably curved; base dorsally sloping and often depressed on ventral edge; outer shell usually spongy or crumbly, becoming firmer as tree gets older, especially on poor soils; pits small, round, numerous; fine short grooves at base; ventral streak medium in length with blunt base. Kernel plump, somewhat variable in shape, wide at base, generally cuneiform, dorsal shoulder sharply rounded, sometimes slightly humped, ventral shoulder sloping; apex plump; pubescence short and rather scant; veins on pellicle distinct.

According to its shape the Drake almond is classed in a group consisting of Ballard, Languedoc, Lewelling, Pistache, Spagon, and Texas. It is most often confused with Texas, Languedoc, and Lewelling. For points of difference between Drake and Ballard, see "Distinguishing characteristics" under the latter variety.

The Drake can be distinguished from the Languedoc by the long ridges and long wide depressions on the ventral edge of the latter; furthermore, the wing in Languedoc is much more prominent than in Drake, especially near the apex.

The Drake can always be distinguished from the Lewelling by the numerous fine grooves at the base of the nut; in the Lewelling the base is smooth or has only a very few coarse grooves. The Lewelling also has a much more prominent flange and wing, and the kernel is much sweeter in flavor.

The Drake and Texas are very often confused. The ventral flange is more prominent on the Texas, the nut is usually smaller, and the flavor of the Texas kernel always has a bitter tinge.

Although the Drake closely resembles the Pistache and Spagon in shape, the very small size of the nuts of the two latter varieties are distinctive.

COMMENTS

The Drake almond owes most of its popularity to its value as a pollinizer for other varieties, particularly the Nonpareil. The Drake has many undesirable qualities. The tree is so scraggly and spreading that it is difficult to prune and keep it in proper shape. It appears to be especially susceptible to diseases and pests, such as apricot brown-rot, crown-gall, and red-spider infestations. It has a marked tendency to alternate bearing (producing a heavy crop one year and a light one the next). The nuts are somewhat unattractive in appearance, have a small percentage of kernel to shell, are rather poor in quality, and have some double kernels. The fact that there is no better pollinizer for the Nonpareil and none that equals it in average production, when a period of years is taken into account, has led to the creation of a market for the Drake as a second-rate nut. It is probable that in the future the market will be more particular in demanding almonds of good size and quality with whole kernels and that the tendency will be to base the price more and more on the percentage of kernel to shell. Plantings of the Drake should not be extended. When necessary to plant the variety as a pollinizer of the Nonpareil, it will be well to limit the Drake to one-fourth or one-third the number of Nonpareil trees planted.

20. EL SUPREMO

Origin.—A variety propagated from a seedling grown on the Wolfskill ranch in the Suisun district. At one time there were a large number of orchards producing the variety, but only occasional trees are now found.

Description

Hulled nut.—(Pl. IV, *C*.) Size varies much, averages large (2 by 1 by ⅝ inches). Number to the pound, 200 to 250. Percentage of kernel to nut in hand-cracked samples, 48.

Shape: Thin; long pointed oval; viewed edgewise, nut is oval, frequently with unsymmetrical sides. Ventral edge gently and evenly curved, curving most sharply at base and apex; wing thin, a mere line at base next to stem scar, gradually increasing in prominence, becoming very prominent at apex, ending in an acute, thin, sharp, recurving, scimitar-shaped point at apex. Dorsal edge almost straight, sharply recurving at apex; dorsal ridge very narrow and prominent. Base slightly tapering and constricted; dorsal shoulder square but small; ventral shoulder round and sloping; stem scar small to large, round or wide oval; at right angles to axis or slightly sloping ventrally. Apex very long and sharp pointed; wing ending in thin, long, sharp, scimitar-like point. Dorsal edge recurving at extreme apex.

Shell: Very soft; outer shell thin, soft, and spongy, light yellow brown. Pits medium in number, medium to large in size, irregular in shape. Surface between pits stippled. Medium length grooves on ventral edge oblique to wing and medium narrow small grooves at base. Canals very small and inconspicuous. Inner shell very thin, papery, and brittle. Inner surface medium dark brown. Ventral streak dark brown, short to medium in length, narrow, with acute or acuminate base end.

Kernels: Many deformed; a considerable number of double kernels. Kernel seldom fills shell cavity. Rather large (average, 1⅛ by ½ by ¼ inches). Wrinkles much in drying. Flat, long oval, or oval ovate. Dorsal and ventral edges curve gently as a rule, but vary much. Base flat, round or slightly truncate. Apex round or bluntly pointed. Pellicle medium to dark brown; thick coarse pubescence abundant and coarse on apex half, gradually decreasing toward base; pellicle fold rather large on apex third or half of ventral edge; base scar small, narrow, dark brown. Flavor slightly sweet, rather poor.

Distinguishing characteristics.—Resembles the Ne Plus Ultra quite closely. It differs from the Ne Plus Ultra in having a much more pointed, scimitar-shaped apex, in the longer kernel, and in having more double kernels.

COMMENTS

The somewhat inferior flavor of the kernel, large proportion of double kernels, and tendency to bear deformed nuts and kernels are points against the variety. It has been disappearing year by year until it is only occasionally found where it was once quite common.

21. ESPARTO

Origin.—A seedling originated on the C. C. Barr ranch, Esparto, Calif. Not grown outside the Esparto district.

Description

TREE

Rather upright (ratio of height of head to width, 1:1⅛). Vigor slightly below average. Branches profusely. Trunk medium stocky, rough, exfoliates in large, thick patches.

Main branches.—Short, fairly upright in growth, curving outward. Branching angle moderately acute. Bark rough on older branches; reddish gray with a gray epidermis.

Twigs.—Tend to be short, stocky, rigid. Wood brittle. Bark thick, tough, green, with brown patches in fall. Nodes small. Internodes short (½ inch).

Lenticels.—Generally few in number, very large (on bark 8 to 10 years old, 3/32 by ⅜ to ⅛ by ½ inch; on 5-year-old bark, 3/32 by 3/16 inch), much raised even on young branches, wide elliptical with tapering acute ends; somewhat diamond shaped on older wood.

Foliage.—Moderately dense. Leaves small and numerous. Tend to be twisted or wavy on edges.

Blade: Small (average, ⅝ by 2½ inches; ratio of width to length, 1:4). Shape elliptical-ovate, occasionally obovate, widest part usually near middle. Base acute; origin of sides symmetrical or nearly so. Apex varies from long acute to bluntly round. Margin crenations shallow and rather long; frequently the margin is distinctly serrate. Midrib slender, prominent. Veins distinct, elevated on lower surface. Upper and lower surfaces light green.

Petiole: Long (average, ¾ inch; ratio of length of petiole to length of blade, about 3:10); slender, bright light green on upper surface, pale green on lower. Tinged with red late in summer. Groove of medium width, shallow. Glands two to four, commonly three, medium size, globular, brownish, reddish, or yellowish.

Bearing habit.—Generally trees of this variety bear most of the nuts on one side only. Most spurs are on wood 2 and 3 years old, but some are on branches 4 and 5 years old. Many spurs are compound, living for two years or longer. Single spurs rather long (5/16 inch) and slender (3/32 inch); expand very suddenly into thin round disk 3/16 inch in diameter. Buds long, constricted at base; scales tough, with very heavy short pubescence on edges.

NUT

Immature nut.—Size medium (1½ by 1 by ⅞ inches). Shape long ovate; part on ventral side of axis ovate; part on dorsal side narrow-ovate or oval-ovate. Edgewise view ovate, sides generally symmetrical, but often unsymmetrical. Ventral edge evenly curved, curving most at base and least at apex; ridge prominent (3/32 inch high), rather narrow (3/16 inch); wide shallow grooves parallel ridge; one side of hull on ventral edge frequently more prominent than the other. Ventral suture crease 1/32 inch wide and 1/32 inch deep. Dorsal edge gently curved, curving most throughout apex half, base half straight or very gently curved; plump; frequently a slight suggestion of ridge. Base plump, bluntly round, usually at right angles to axis, but occasionally very slightly ventrally or dorsally sloping, with very short grooves; stem cavity oval, ¼ to 5/16 inch across, 1/32 to 1/16 inch deep. Apex acutely pointed, tapering from near middle of nut to tip; style stays on late; rudiment small; ventral suture crease depressed at apex.

Hull: Outer surface green at first, changing to yellow with reddish parts late in season; pubescence very abundant, long, medium fine, gray, felty. Color of inner surface green, turning rapidly to yellowish brown as dehiscence proceeds. Dehisces along ventral edge; hull curls inward at ventral edges and opens at same time, one half curling faster than the other; very slight cracks appear at base of dorsal edge, but complete dehiscence occurs on ventral edge only. Ripens from August 28 to September 12.

Hulled nut.—(Pl. IV, *D.*) Size medium (1⅜ by 15/16 by ¾ inches). Number to the pound, 130 to 180.

Shape: Plump, somewhat variable, narrow to wide ovate; viewed edgewise, ovate; sides frequently unsymmetrical. Ventral edge usually regularly curved, but sometimes a tendency to be straight at middle of wing. Wing medium in thickness and very prominent the entire length of ventral edge, being least prominent at apex. Dorsal edge gently curved, base elevated higher than base of ventral edge. Suture line or fiber along dorsal edge distinct. Dorsal ridge slightly prominent. Base slopes ventrally (when viewed edgewise slightly constricted near stem scar); stem scar small, depressed, dorsal shoulder much elevated above ventral. Apex bluntly pointed; wing ends in short thick tip. Dorsal edge curved in slightly at immediate apex.

Shell: Hard; dark brown in color; pits medium in number, large, irregular in shape, some connected with canals on surface. Pits numerous and shallow on dorsal edge. Short fine grooves at base. Very short wide grooves running off at obtuse angles on ventral edge both sides of wing. Part of shell between pits hard, but stippled. Outer shell quite thick and hard. Canals rather large, oval in shape, flat. Network coarse, fibers large. Inner shell rather thick and hard, dark brown in color. Ventral streak very dark brown, very wide, medium in length with apex bluntly acute and base broad and round. Very dark brown in color.

Kernel: Plump; many doubles; 30 to 35 per cent of nut is kernel. Size average, medium ($\frac{7}{8}$ by $\frac{1}{2}$ by $\frac{5}{16}$ inch). Shape, obovate. Ventral edge very thick and plump, gently curving. Dorsal edge rather straight, of medium thickness, curving suddenly at base and apex. Dorsal shoulder thin, square, and much elevated above ventral. Ventral shoulder plump, round and sloping. Apex, acute to blunt and usually thin. Pellicle, very dark brown in color, tough; pubescence very thick and heavy; base scar very large and irregularly round in shape; pellicle fold small and one-half length of ventral edge. Flavor dry, but very sweet.

Distinguishing characteristics.—Grown only in the Esparto district. Nut plump, ovate; ventral edge much curved, wing prominent, least prominent at apex; base scar slightly ventrally sloping; shell hard; kernel heavily pubescent.

COMMENTS

The hard shell, tough, dark, very heavily pubescent, and generally unattractive pellicle, presence of doubles, and the fact that the almonds are not well distributed on the tree are disadvantages. The variety is not to be recommended for future planting.

22. EUREKA (CRESCENT, LITTLE JORDAN)

Origin.—From trees resulting from the planting of a sack of almonds in 1883 A. M. Newland, of Colusa, Calif., selected 69 trees which appeared promising. One of the best of these he named the "Eureka." In 1886 he planted a number of the Eureka trees. Nursery firms soon became interested, and the variety was planted on a small scale in different sections of California. The Eureka, however, was never widely advertised, and inferior seedlings, later called Eureka by others, became more widely scattered than the true Eureka. "Crescent" and "Little Jordan" are other names by which the variety is known. The Eureka is now commercially grown mostly in the Colusa, Davis, and Winters districts.

Description

TREE

A hardy but somewhat slow grower. Very upright (ratio of width to height of head, $1:1\frac{1}{2}$). Very compact, very bushy. Trunk slender, slow grower; bark somewhat rough, exfoliating in small flakes.

Main branches.—Rather long, stocky, frequently with long, flat depressions. Branching angle acute except on lower branches. Wood very hard. Bark very tough, yellowish brown with gray epidermis; exfoliates in small flakes; striations common on young branches.

Twigs.—Medium in length, medium slender, rigid. Very many lateral branches. Branching angle acute. Wood tough. Nodes rather small. Internodes short to medium ($\frac{3}{8}$ to 1 inch). Bark light green, upper surface turning to reddish brown or rusty red later in the season. Striations show early.

Lenticels.—Medium in number, large ($\frac{1}{16}$ by $\frac{1}{8}$ to $\frac{3}{32}$ by $\frac{5}{8}$ inch), slightly raised, grayish brown, wide, oval, with blunt ends. Lenticels on young bark very numerous, grayish, rather large, conspicuous.

Foliage.—Very dense. Leaves small but very numerous. Leaves tend to recurve or fold or roll up along midrib. (Pl. XXVI, *C.*)

Blade: Small to quite large (½ by 2¼ to 1¼ by 3¾ inches); average rather small (¾ by 2⅝ inches; ratio of width to length, 2:7). Shape generally elliptical ovate; narrow, but width varies. Base acute; origin of sides symmetrical or slightly unsymmetrical. Apex long, tapering, acute. Margins irregular, usually crenate, the depth, regularity, and length of crenations varying; occasionally margins are dentate or serrate. Midrib rather large and prominent. Veins medium distinct. Upper surface of blade glossy, light green; lower surface slightly lighter than upper. Leaves remain on tree very late, some remaining over winter until new leaves start in the spring.

Petiole: Varies somewhat in length and stockiness (averages ¾ inch in length; average ratio of length of petiole to length of blade, 2:7). Rather rigid; frequently twisted; light green in color; the narrow, deep groove is slightly darker than the rest of the petiole. Glands two to eight, commonly two or four, rather small dark brown, always on petiole near base of blade. Sometimes serrations may appear on petiole; very occasionally a stipule is present.

Bearing habit.—Bears good crops. Nuts commonly borne in pairs. Spurs mostly on wood 2 and 3 years old; long (¼ to 5/16 inch) and medium in diameter (⅛ inch), expand suddenly to form wide oval or almost round disk (⅛ by 3/16 to 3/16 by ¼ inch). Bears some on laterals as well as on spurs. Buds free, plump, slightly flattened, bluntly tapering; scales rather large, dark, reddish brown, thin, tough, with considerable short, gray pubescence on edges.

NUT

Immature nut.—Size, rather small to medium (1½ by ¾ by ⅝ to 1¼ by ⅝ by ½ inches). Shape crooked, irregular ellipse. Ventral edge much curved, depressed at base. Dorsal edge straight or recurved, usually considerably recurved at apex, giving it a crescent shape; no dorsal ridge. Base much tapering, depressed on dorsal edge. Apex pointed, recurved on dorsal edge; scimitar shaped.

Hull: Outer surface green, changing to greenish brown or grayish brown; pubescence gray, medium length, fine, felty. Rudiment short. Edges of halves where dehisced, dark brown in color, much darker than rest of hull. In dehiscing, inner surface of hull usually takes a portion of the outer shell of the nut with it. Dehisces on ventral edge only; halves spread unequally; edges have tendency to roll inward. Ripens from August 25 to September 25.

Hulled nut.—(Pl. IV, *E.*) Size rather small to medium (1⅛ by 11/16 by ½ to 1¼ by ⅝ by ½ inches). Number to the pound, 220 to 300. Percentage of kernel to shell in hand-cracked samples, 50; in machine-cracked orchard run, 32.

Shape: Plump, very long in proportion to length; viewed flatwise, crescent shaped, oval. Viewed edgewise, long ovate, sides usually symmetrical, curving outward at base, very gently curving outward at apex. Axis very close to dorsal edge. Ventral edge curving, most sharply curving near apex. Wing distinct, but never prominent, usually not pronounced at base and most pronounced at apex, medium in thickness to thin. Dorsal edges rather straight, gently curving outward near base, curving inward near base or near apex, with slight grooves or pits. Base very pointed, usually depressed on ventral side. Stem scar small, nearly round, usually slightly elevated, at right angles to axis or sloping slightly either ventrally or dorsally. Apex distinctive; ventral edge curved abruptly so as to approach axis (which is very close to the dorsal edge) at nearly right angles to the dorsal edge, giving the point a sharp distinctive curve dorsally.

Shell: Various shades of light brown in color; soft. Outer shell soft and crumbly. Pits quite numerous, variable in size and shape, mostly round and rather small, occurring even on dorsal ridge; surface of shell between pits coarsely stippled. Short grooves appear on ventral edge and frequently deep, irregular grooves at base end. Canals numerous and large. Network of large fibers. Inner shell thin. Inner surface light brown, lighter in color than outer surface, with shallow ridges longitudinally. Ventral streak short to medium in length, medium narrow in width, rich brown, apex acuminate, base wide, round, and never close to base of nut, frequently only slightly past middle of ventral edge.

Kernel: Some doubles; size medium (⅞ by ½ by ⅜ inch). Occasionally a gummy kernel is found. Very long in proportion to width. Plump. Fills shell cavity well. Shape distinctive, but varies somewhat. Ventral edge curved similar to ventral edge of shell, round and plump. Ventral shoulder flat, decidedly sloping, approaching axis at an acute angle. Dorsal edge fairly straight and sharper than ventral. Dorsal shoulder plump, sharply rounding, and elevated above ventral shoulder. Arrangement of shoulders gives base a round-pointed, lopsided appearance. Apex usually pointed and curving dorsally. Pellicle light brown, thin; veins visible, but not distinct. Covered with very short heavy pubescence, so short that the kernel appears smooth; pellicle fold very short, extending only one-fourth way up toward base. Pubescence slightly heavier along ventral edge near pellicle fold than elsewhere. Flavor, sweet, good.

Distinguishing characteristics.—The shape of this nut places it in a class with California Jordan, Favorite, Gilt Edge, and Sellers. The shape, however, is very distinctive; nut long, plump, somewhat crescent shaped, widest portion frequently nearer apex than base, dorsal edge nearly straight, often recurving at apex, base tapering, pointed, constricted, shell soft, crumbly, pits large and irregular in shape. Kernel long, tapering at both ends, dorsal edge quite straight; pellicle with pubescence so short as to appear almost smooth to the eye, but enough to give it the texture of very fine sandpaper when finger is rubbed over it.

The shape of the Eureka closely resembles that of the California Jordan, which see.

COMMENTS

Records of the blooming dates of the Eureka show that it may be useful as a pollinizer of the Nonpareil. The Eureka shell is soft, the kernels are attractive, and the nut though small has met with favor where known. It is probable that as it becomes better known the demand will increase. Although the variety is promising, plantings should be made gradually until its marketing value and its conduct in different districts are ascertained.

OTHER SO-CALLED EUREKAS

Many seedlings have been locally miscalled the " Eureka." In some sections the name " Eureka " is given to the Provence. A seedling closely resembling the Eureka is found in the Lodi, Acampo, and Oakdale sections. It may be distinguished from the Eureka by the following differences: Apex does not curve dorsally; wing prominent entire length of ventral edge; dorsal ridge more prominent than in Eureka; pits in shell larger; short grooves present at base. Shell coarser than Eureka; many double kernels; pellicle dark brown in color and very pubescent. This nut is easily distinguished from the true Eureka when the two are seen together, but is easily mistaken for it when seen by itself.

23. FAIR

Origin.—In question. Has been grown to a limited extent for years.

Description

Hulled nut.—(Pl. V, *A*.) Size medium (1½ by 1 by ⅝ inches). Number to the pound, 225 to 240. Percentage of kernel to nut in hand-cracked samples, 50.

Shape: Medium long, ovate, slightly resembling Ne Plus Ultra. Axis usually near dorsal edge, but this varies. Edgewise view long-ovate or elliptical. Ventral edge curved, a little straighter than in Ne Plus Ultra. Wing varies in thickness, usually medium in thickness and medium in prominence. Dorsal edge quite straight up to shoulder, curving inward at apex. Dorsal ridge narrow and quite elevated. Base bluntly to sharply rounding, either plump or slightly flattened; ventral shoulder rounding, dorsal shoulder rather square; stem scar small and elevated or on level with surrounding parts, at right angles to axis or slightly ventrally sloping. Apex plump. Acute to bluntly acute, tip frequently slightly scimitar shaped. Ventral edge of base gradually curving, dorsal edge of apex curves inward.

Shell: Light grayish brown. Pits numerous, large and deep, but variable in size in same nut. Surface between pits finely stippled. Pits and fine grooves on dorsal edge. Narrow and rather deep grooves on base and on ventral edge, running at acute angles to wing on both sides. Outer shell rather firm, but thin, with considerable spongy material between outer and inner shell. Canals medium in number, medium in size. Fibers medium in size. Inner shell thin, dark brown in color. Ventral streak long, medium in width; peculiar in that the widest portion is near the apex, narrowing backward to acute point at base.

Kernel: Does not quite fill shell. Some gummy nuts. Percentage of kernel to nut, 50. Large (1⅛ by 9/16 by ⅜ inches). Long ovate. Edgewise view, long ovate. Edges curve gradually, ventral edge being more curved than dorsal. Dorsal edge thinner than ventral. Dorsal shoulder rounding or slightly square. Ventral shoulder plump and sloping as a rule. Apex acute with ventral edge slightly curved. Pellicle tough; dark brown; rather smooth near base; heavily pubescent with very coarse pubescence on apex half; pellicle fold on apex third of ventral edge. Base scar round or oval. Veining visible. Flavor dry, slightly sweet.

Distinguishing characteristics.—This nut comes into the market as Ne Plus Ultra, which it resembles in shape. The nut is slightly smaller, the base slightly more constricted, the kernel usually narrower and less pubescent than in the Ne Plus Ultra. For points of distinction between it and Hudson and Bigelow, see those varieties.

COMMENTS

The soft shell, large proportion of kernel to shell, large kernel, and absence of doubles are points in favor of this variety. The nut and somewhat pubescent kernel are not so attractive in appearance, however, as are those of other varieties. There is some gum, the kernels are inferior in quality to the Ne Plus Ultra, and the nut is, therefore, not as desirable commercially. The variety should be eliminated. At the present time the acreage of Fair almond is small, the nuts coming into the market as Ne Plus Ultra, which, in the shell, they resemble closely.

24. FAIROAKS

Origin.—Trees of the variety have been grown since 1910. The exact date of origin is in question. The trees were originally obtained in nursery stock bought as I. X. L. They turned out to be seedlings, which bore good crops and were distributed in the Fairoaks district of California under the name "Fairoaks." Not grown elsewhere.

Description

TREE

Upright (ratio of width of head to length, 1:1). Below average in rate of growth. Scraggly and bushy, but not so much so as the Drake. Trunk rather slender; irregular in growth; bark rough, cracks deep; exfoliates in thick patches.

Main branches.—Numerous. Vary in length and stockiness, average medium in length and rather slender. Tendency to grow upright; branching angle moderately acute, smaller branches tend to curve toward larger branches. Wood tough. Bark thick, tender, very dark reddish brown, with small, thin patches of gray epidermis. Young branches striated with gray; occasionally entire branch covered with gray epidermis. Bark rough on older branches. Many knots.

Twigs.—Medium in length; rather slender; moderately flexible as a rule. Nodes medium in size. Branching angle moderately acute. Internodes rather short (⅓ to 1 inch). Bark very light green when young; usually with much waxy bloom; dark reddish brown patches in autumn.

Lenticels.—Moderately numerous (vary much); inclined to be numerous in patches and few in other places; small to large on old wood (on bark 8 to 10 years old 1/16 by 3/16 to ¼ by ⅝ inch; average 3/32 by 3/16 inch). Shape wide elliptical; sides curving, gradually increasing in curve from middle to bluntly acute ends. On twigs lenticels numerous, small, grayish green, inconspicuous.

Foliage.—Dense. Great majority of leaves in clusters on spurs. Leaves flat or slightly recurved, or slightly curved upward along midrib.

Blade: Small (⅝ by 2 to 1 by 3 inches; average ⅞ by 2¾ inches; ratio of width to length, about 1:3). Shape wide ovate with gradually tapering apex. Widest portion of leaf generally near the middle. Base widely acute to obtuse, rounding, origin of sides very slightly unsymmetrical. Apex long and tapering; extreme tip either acute or blunt. Margin rather coarsely and deeply crenate; one basal crenation frequently somewhat glandular; sometimes basal pair of crenations very small. Color of upper surface of blade bright light green. Lower surface dull and lighter in color than upper with considerable bloom. Midrib medium slender and prominent, light green in color, and frequently with a small amount of short pubescence. Veins distinct, raised on lower surface, and generally slightly raised on upper.

Petiole: Long (average length 1 inch; ratio of length of petiole to length of blade, about 1:3); slender, flexible, tendency to enlarge considerably where joining twig, light green, slightly tinged with red in autumn. Glands two to six, commonly two, three, or four; medium size; prominent; globular or elevated oval; yellowish green; frequently reddish in late fall.

Bearing habit.—On spurs; nuts frequently in clusters; mostly on wood 2 and 3 years old. Spurs very long ($\frac{1}{4}$ to $\frac{1}{2}$ inch), very stocky ($\frac{3}{8}$ to $\frac{1}{4}$ inch in diameter). Disk elliptical ($\frac{3}{16}$ by $\frac{1}{4}$ inch). Spurs frequently branching, with two nuts on spur. Buds free, generally rather small, plump, short, conical, bluntly pointed; scales dark brown, medium to large in size, rather thick and hard, with heavy, short pubescence on edges. Ripens a little earlier than Nonpareil.

NUT

Immature nut.—Hull thick. Color of outer surface before dehiscing yellowish green with pink dots or splashes; pubescence abundant, coarse, short; usually has reddish tinge on ventral edge of opening hulls; style remains on long (until dehiscence starts). Dehisces on ventral edge only, but frequently cracks appear at base; usually has reddish tinge on ventral edges of opening hulls. Halves open unequally as a rule.

Hulled nut.—(Pl. V, *B.*) Size rather small to medium (average, 1$\frac{1}{4}$ by $\frac{7}{8}$ by $\frac{5}{8}$ inches). Number to the pound, 240 to 280.

Shape: Medium plump; wide ovate; axis quite near the middle. Edgewise view, oval with pointed apex. Ventral edge evenly and sharply curved; wing thin and medium in prominence along entire edge, least prominent near stem scar. Dorsal edge very slightly curved until near apex, where it curves sharply at the tip; dorsal ridge wide, not prominent, usually fibers showing. Base plump and rounding; dorsal shoulder rather square; ventral shoulder rounding and sloping; stem scar small, narrow, and on the level with shell or very slightly depressed, at right angles to axis or sloping slightly either ventrally or dorsally. Apex obtusely pointed, with very prominent wing as a rule, ventral edge gently curving at tip; dorsal edge curving at tip nearly as much as ventral. Viewed edgewise tip is acute, frequently with sides curving inward.

Shell: Light brown, soft; outer shell thin and crumbling, flaking off readily. Pits numerous, round, or irregular, quite large, deep. Surface between pits stippled. A few short grooves at base; shallow grooves, numerous in number, run off at angles to wing in ventral edge. Canals close together and large. Network of fibers rather small, except a few near ventral edge which are large. Inner shell thin, light brown in color. Ventral streak, variable; usually fairly long and medium in width; base end round or sometimes narrowing from center to blunt base; light brown, a little darker than inner surface of shell.

Kernel: Some doubles (5 per cent). Medium size ($\frac{7}{8}$ by $\frac{9}{16}$ by $\frac{3}{8}$ inch). Moderately plump, cuneiform, or cuneiform-ovate; widest portion near base; shape between Nonpareil and I. X. L. Sides nearly even in length and curve. Edgewise view long ovate or oval with straight sides. Base broad and truncate. Both ventral and dorsal shoulders have a tendency to be square and humped, but frequently are round. Dorsal shoulder very slightly more rounding than ventral and thinner. Apex blunt. Pellicle medium tough, covered with very short pubescence, veining indistinct, pellicle fold on apex third of ventral edge; base scar small, round. Flavor flat, slightly sweet, dry.

Distinguishing characteristics.—On account of its shape, this variety is in the group including the Brown, Cartagena, Concord, Golden State, Rice, Routier, and various California seedlings. The following characteristics are helpful in distinguishing this variety from others: Shell soft, light in color, outer surface crumbly; pits deep and usually large, surface between pits coarsely stippled; ventral edge much curved, wing prominent, short oblique grooves common on ventral edge; dorsal edge curving at apex nearly as much as ventral, frequently incurving; apex blunt; kernel with truncate base, usually with square dorsal shoulder, often ventral shoulder square.

The variety is grown only in the Fairoaks district. It is distinguished from other varieties in the same group by the truncate base and square dorsal shoulder of the kernel.

COMMENTS

Although this variety bears well and produces a soft-shell nut, the flavor of which is fair, the crumbly outer shell, which rubs off badly in handling, makes its appearance unsatisfactory. The nuts vary somewhat in size, even on the same tree. Many growers claim the nut is rather hard to knock and object to it on that account. Not recommended for further planting.

25. FAVORITE (KNIGHT'S FAVORITE)

Origin.—In 1887 George Knight, of Knightsen, Calif., found a seedling tree on his neighbor's place which bore regularly and well. Mr. Knight propagated some of the trees in his nursery, and they were soon widely distributed in the Oakley district, being known as the Favorite or Knight's Favorite. The most extensive plantings of this variety are in the Oakley district, but occasional trees, frequently under other names, are found in other sections of the State.

Description

TREE

Vigorous, upright. Round topped. Lower branches slightly drooping. Trunk stocky with rough bark.

Main branches.—Upright, but lower branches drooping. Branching angle moderately acute. Wood quite tough. Old bark rough. Young bark smooth, brown, with gray epidermis.

Twigs.—Rather short and stocky. Wood tough. Branching angle acute. Internodes long ($\frac{3}{4}$ to $1\frac{1}{2}$ inches). Bark smooth, pale green, considerable bloom, brownish patches in autumn.

Lenticels.—Few in number. Size on bark 8 to 10 years old, $\frac{1}{32}$ by $\frac{3}{16}$ to $\frac{1}{16}$ by $\frac{1}{4}$ inch. Shape wide oval with acute ends, slightly raised, dark gray, usually a longitudinal crack in middle. On younger bark lenticels frequently diamond shaped.

Foliage.—Of medium density. Leaves either flat or slightly rolled upward from midrib; frequently wavy along margins.

Blade: Medium in size ($\frac{3}{4}$ by 3 inches; ratio of width to length, 1:4). Shape, width, and size varies. Shape elliptical or ovate-elliptical. Base obtuse. Margins curve sharply. Origin of margins symmetrical or nearly so. Apex varies from sharply to bluntly acute. Margins curve gently, tend to straighten near tip; crenations long and shallow, bristles long. Midrib slender, pale green. Veins fine and distinct. Color of upper surface light green. Lower surface lighter than upper.

Petiole: Long (1 inch) but somewhat variable (ratio of length of petiole to length of blade about 1:3); slender, flexible, light green, tinged with red in autumn, especially on upper surface. Groove deep and rather narrow. Glands one to four, usually two, sometimes one or more; small; globular; yellowish brown; on petiole, usually a short distance from base of blade.

Bearing habit.—Usually on wood 2 and 3 years old. Spurs frequently produced on tops of short laterals. Spurs rather slender ($\frac{1}{16}$ to $\frac{3}{32}$ inch) and long ($\frac{5}{16}$ inch); expand to oval disk $\frac{3}{16}$ by $\frac{1}{4}$ inch. Leaf buds free, fairly long, plump in middle, pointed.

NUT

Immature nut.—Medium in size ($1\frac{3}{4}$ by 1 by $\frac{3}{4}$ inches). Elliptical-ovate. Ventral edge sharply and evenly curved throughout; narrow ridge lacks prominence ($\frac{1}{32}$ inch high); suture depression narrow ($\frac{1}{32}$ inch) and shallow ($\frac{1}{64}$ inch). Dorsal edge plump, nearly straight. Base at right angles to axis or very slightly ventrally sloping; tapering; ventral shoulder gently sloping. Dorsal shoulder square, extending $\frac{3}{16}$ inch from edge of disk then dropping off suddenly. Stem cavity $\frac{1}{4}$ to $\frac{5}{16}$ inch across and $\frac{1}{32}$ inch deep. Apex rather thin, pointed, with ventral edge gently curving; dorsal edge almost straight; ventral suture slightly depressed at apex. Rudiment small.

Hull: Outer surface green, turning to grayish brown or reddish brown as dehiscence proceeds; pubescence rather short, medium thick, fine, gray, woolly.

Inner surface pale green turning gradually to dark brown during dehiscence. Dehisces along ventral edge with occasional very short cracks on base end of dorsal edge. Halves open outward at middle, the base and apex parts curving inward rapidly; one half usually curves faster than the other. Ripens from August 22 to September 10.

Hulled nut.—The nut is very similar to the Gilt Edge except the apex is more pointed, the dorsal edge straighter, and the kernel slightly more pubescent and somewhat inferior in flavor. The stem scar in Gilt Edge is at right angles to the axis or slightly sloping ventrally, while in the Favorite the scar is at right angles or sloping slightly either ventrally or dorsally. The shell varies from a heavy soft to a light hard one. (See Gilt Edge.)

COMMENTS

The variety has nothing to commend it. It should be eliminated.

NOTE.—Several other seedling trees have been known in certain localities as the "Favorite." Most of these have now disappeared.

26. FLINT

Origin.—The name "Flint" has been given to a number of hard-shelled almonds. It is now applied almost entirely to a hard-shelled variety originated and grown in the Oakdale district of California. It is this variety which is described below.

Description

TREE

Vigorous, round topped. Upright (ratio of height of head to width, 1:1); tends to spread somewhat, lower branches droop. Trunk stocky, long, straight, with rough bark.

Main branches.—Well distributed, fairly long, slender. Branching angle rather acute. Wood brittle; many knots. Bark smooth; striated on young growth.

Twigs.—Rather long; tend to curve. Branching angle acute. Internodes short (¼ to 1 inch). Nodes quite large. Wood brittle. Bark thick and tough, smooth, light green with reddish patches in fall; small amount of pubescence on twigs.

Lenticels.—Quite numerous. Size on wood 8 to 10 years old, $\frac{1}{16}$ by $\frac{3}{16}$ to $\frac{1}{16}$ by $\frac{3}{32}$ inch. Raised, ash gray, long, narrow, elliptical, ends acute; cracks longitudinally through middle. Lenticels on young growth numerous.

Foliage.—Very dense. Leaves slightly recurved near apex, folded upward slightly along midrib. (Pl. XIX, *A*.)

Blade: Varies much in size and shape; small to medium (⅝ by 2½ to 1⅛ by 3 inches); ratio of width to length varies from 1:4 to 1:3. Shape ovate, elliptical, or obovate. Base acute or obtuse, margins frequently curving inward at immediate base; origin of margins usually symmetrical. Apex generally blunt, sometimes acute, with margins generally curving inward slightly near tip. Margins irregularly crenate, bristles rather long and sharp. Upper surface of blade smooth, dark green. Lower surface lighter than upper, but somewhat darker in most varieties, frequently with bloom. Midrib prominent; very light in color. Veins very distinct.

Petiole: Varies in width; rather uniform in length in mature leaves (average quite long, 1 inch); ratio of length of petiole to length of blade, about 2:7. Upper surface green; lower surface very pale. Groove shallow. Glands one to six; usually two, at base of blade and nearly opposite each other; globular; brownish.

Bearing habit.—Mostly on 2-year-old wood. Some nuts borne on 1-year-old laterals. Many spurs stocky and compound, but bear only once and then die. Single spurs medium in length (¼ inch) and thickness (⅛ inch), spurs expanding very suddenly to thin; oval disk ⅛ by ¼ inch. Buds large.

NUT

Immature nut.—Size, small to medium (average 1½ by 1⅛ by ⅞ inches). Shape oval-ovate; oval-cordate on ventral side of axis, oblong-elliptical to dorsal side. Plump, especially at base. Edgewise view ovate. Ventral edge much curved. Dorsal edge much shorter and curved less than ventral. Base plump, frequently corrugated, very much dorsally sloping; stem cavity shallow ($\frac{1}{64}$ to $\frac{1}{32}$ inch deep). Apex rather thin, bluntly obtuse, with small sharp tip; rudiment rather large and very pubescent.

Hull: Outer surface of hull green, changing to yellowish; pubescence abundant, long, fine, gray, silky. Dehisces on ventral edge only. Short cracks frequently appear at base. Base end of ventral edges of halves roll outward as a rule, the rest of the edges curving inward. The halves sometimes curl unequally. Ripens late.

Hulled nut.—(Pl. V, *C*.) Size variable, tends to run rather small (1 by $\frac{3}{4}$ by $\frac{1}{2}$ to $1\frac{1}{2}$ by 1 by $\frac{3}{4}$ inches; average, $1\frac{1}{4}$ by $\frac{7}{8}$ by $\frac{5}{8}$ inches). Number to the pound, 120 to 140. Percentage of kernel to nut in hand-cracked samples, 35.

Shape: Plump, very wide oval; part on ventral side of axis wide-cordate. Both ventral and dorsal edges much curved, dorsal edge curved less than ventral. Dorsal ridge medium in width, prominent. Ventral flange wide, prominence slight to medium. Base plump, very broad; dorsal shoulder slightly sloping, not prominent; ventral shoulder rounding, elevated above stem scar, frequently slightly depressed on upper surface; stem scar large, wide, oval. Base and stem scar sharply dorsally sloping. Apex broadly rounding or widely pointed.

Shell: Hard; outer surface medium to light brown. Outer shell thick, hard, flinty, smooth outer surface. Pits medium to numerous, small, round, generally shallow, are present on sides and dorsal edge right up to dorsal ridge, but are not present on the ventral edge for a distance of $\frac{1}{8}$ to $\frac{1}{4}$ inch on each side of wing. The ventral edge is remarkably smooth near the wing. Canals rather numerous, quite small, commonly nearly round. Fibers small. Inner shell medium thick, very hard. Inner surface medium brown and smooth. Ventral streak dark brown, short, very wide, base end bluntly acute.

Kernel: Very many doubles (75 per cent). Single kernels small to quite large (average, 1 by $\frac{1}{2}$ by $\frac{3}{8}$ inches); plump, ovate. Both dorsal and ventral edges slightly curved. Base quite wide, medium plump, gently rounded. Apex broadly and suddenly tapering. Pellicle light brown, covered with short coarse pubescence; veins distinct or indistinct; pellicle fold small, on lower one-third of ventral edge; base scar medium size, medium dark brown, quite prominent, round. Flavor slightly sweet, flat, dry, inferior.

Distinguishing characteristics.—The plump, very wide oval, hard-shelled nut, with distinctly dorsally sloping base and large preponderance of double kernels, is easy to distinguish from all others.

COMMENTS

This inferior nut, with its hard shell, large proportion of double kernels, small percentage of kernel, and rather inferior flavor, should be eliminated as rapidly as possible from the commercial crop. The recent removal of some trees and top-working of others to more desirable varieties have greatly reduced the quantity of this variety which comes into the market.

27. GARWOOD

Origin.—A seedling variety originated in the orchard of W. S. Garwood, Oakley, Calif., 1907. Grown in the Oakley district.

Description

TREE

Upright but rather open and spreading at the top. Trunk rather stocky, straight; bark rough, exfoliating in small flakes.

Main branches.—Medium long, rather stocky; tend to grow upright. Branching angle sharply acute. Wood medium brittle. Tendency to produce many small twigs. Bark smooth, dark cherry red with patches of gray epidermis, much gray epidermis on young wood.

Twigs.—Straight. Nodes medium in size; internodes rather short; branching angle acute. Wood brittle. Bark tough, dark green, reddish patches in autumn.

Lenticels.—Very numerous, running together in patches. Size variable (bark 8 to 10 years old, $\frac{3}{32}$ by $\frac{1}{4}$ to $\frac{3}{32}$ by $\frac{1}{2}$ inch). Slightly raised, gray, oval; acute ends with apexes acuminate.

Foliage.—Of medium density. Leaves rather numerous on individual branches.

Blade: Medium in size (average $\frac{7}{8}$ by 3 inches; ratio of width to length, about 2:7). Shape elliptical or ovate-elliptical, the width being somewhat variable. Base medium obtuse to very obtuse, bluntly round to tapering; origin of sides usually symmetrical. Apex acute and somewhat tapering; sides vary in curve. Midrib slender, prominent, very light in color. Margins wavy, crenations shallow and narrow. Upper surface deep, medium green. Lower surface light green.

Petiole: Variable in length ($\frac{5}{8}$ to $1\frac{1}{4}$ inches, average, long, $1\frac{1}{16}$ inches; ratio of length of petiole to length of blade, 2:7 to 5:12). Light green, tinged with red slightly in fall. Groove wide and very shallow. Glands two to six, usually two. Small to medium in size; oval in shape; yellowish brown; frequently basal pair of crenations glandular and accompanied by two to four normal glands on petiole.

Bearing habit.—Bears well, mostly on branches 2 and 3 years old. Many spurs compound and long (1 to $1\frac{1}{2}$ inches). Single spurs medium in length ($\frac{1}{4}$ inch) and thickness ($\frac{1}{8}$ inch), expands suddenly to wide oval disk $\frac{1}{4}$ to $\frac{3}{16}$ inch wide. Buds plump, long, constricted at base; scales thin, hard, large, reddish, with very short pubescence on edges.

NUT

Immature nut.—Quite large ($1\frac{3}{4}$ by $1\frac{3}{8}$ by 1 inches). Shape cordate-ovate, i. e., part on ventral side of axis cordate; part on dorsal side oval or ovate. (Edgewise view ovate with plump base and tapering apex.) Ventral edge much curved; ridge wide ($\frac{1}{4}$ inch) and high ($\frac{3}{32}$ to $\frac{1}{16}$ inch). Distinct grooves parallel with ridge (shallow grooves also on sides of hull). Dorsal edge very much shorter than ventral edge and much less curved. Base plump; short grooves; very much dorsally sloping; ventral shoulder prominent; dorsal shoulder not prominent; cavity $\frac{3}{8}$ to $\frac{1}{2}$ inch wide and $\frac{1}{16}$ inch deep. Apex bluntly tapering into a round point, frequently slightly depressed; style drops quite early; rudiment very small.

Hull: Outside green, turning first yellowish and later to a dark grayish brown; pubescence thick, short, fine, gray, silky. Inner surface pale green as dehiscence starts, turning rapidly to a rich brown. Dehiscence starts on ventral edge, followed by the dorsal edge dehiscing usually from base downward, although there is much variation in this regard; sometimes dorsal edge starts to crack in middle and sometimes at apex; usually apex is the last to divide; occasionally nut does not dehisce on dorsal edge. Ripens from August 14 to 28.

Hulled nut.—(Pl. V, *D.*) Size rather large ($1\frac{3}{8}$ by $1\frac{1}{4}$ by $\frac{7}{8}$ inches). Number of nuts to the pound, 125 to 135. Percentage of kernel to nut in hand-cracked samples, 28.

Shape: Medium plump, wide-cordate (viewed edgewise, ovate, sides usually unsymmetrical, curving in at the long thin apex). Ventral edge much curved, giving the part on the ventral side of the axis a cordate shape. Ventral edge about twice as long as dorsal. Longitudinal groove and ridges present; flange very thick, exceedingly prominent, ventral suture distinct. Dorsal edge short and straight, curving sharply at apex. Dorsal ridge usually narrow and very prominent. Base moderately plump, very wide, and much sloping dorsally. Ventral shoulder elevated much above stem scar and round. Dorsal shoulder rather square, or sloping, and very thin and projecting. Stem scar small, long and narrow, giving sloping top a concave appearance; sloping sharply dorsally. Apex blunt, thin, long, with short little point. Viewed edgewise, thin and long with incurving sides as a rule.

Shell: Light to dark brown, quite hard; gets harder as the trees get older. Pits medium in number; size variable, mostly large, round, deep. Pits and short grooves on ventral flange. Pits in dorsal edge smaller than on side of nut. Shell between pits hard, smooth; large, short depressions present. Grooves and heavy wrinkles on base. Canals and fibers large. Inner shell quite thin. Inner surface light to dark brown in color and frequently shallow ridged. Ventral streak light to dark brown, usually long, narrow, narrowing from middle to base.

Kernel: Medium thick, short, wide ovate. Small in size for size of nut ($\frac{7}{8}$ by $\frac{5}{8}$ by $\frac{3}{8}$ inch). Edgewise view cuneiform or ovate cuneiform. Dorsal and ventral edges have the same curve, or frequently dorsal edge curves more than ventral, especially at apex. Base roundish; dorsal shoulder slightly sloping and thin.

Apex usually blunt, with dorsal edge usually much more sharply curving at apex than ventral. Pellicle medium thick, light to dark brown, veins distinct, pubescence unusually coarse and short, pellicle fold on apex half of ventral edge rather heavy; base scar small, round, dark, slightly elevated. Flavor rather flat, sweet; medium in quality.

Distinguishing characteristics.—Nut cordate, short, and wide; dorsal edge only one-half as long as ventral; ventral edge wedge shaped in cross section, flange very thick, heavy, prominent; dorsal ridge very thin and prominent; base very sharply dorsally sloping, with deep depressions and sharp elevations, giving it a puckered appearance; stem scar long; apex blunt.

This nut somewhat resembles in shape the Bidwell, Tarragona, and Washington. It is distinguished from them by its characteristic ventral flange, with slight longitudinal ridges on ventral edge unaccompanied by depressions, by the much wrinkled or puckered base, and by the thin and very prominent dorsal ridge.

COMMENTS

The small proportion of kernel to shell precludes this variety from further commercial plantings. The hardness of the shell increases as the tree gets older.

28. GILT EDGE

Origin.—Uncertain. The variety probably originated in the Oakley district, where it has been grown to a considerable extent for years. It is found to a limited extent in other districts in California.

Description

TREE

Moderately spreading (ratio of height of head to width, **1:1$\frac{1}{8}$**). Quite vigorous. Trunk stocky with rough, gray bark.

Main branches.—Tend to grow rather short. Branching angle obtuse. Lower branches drooping. Branches somewhat bushy. Wood brittle. Bark tough, gray.

Twigs.—Rather short. Branching angle widely acute. Nodes rather small. Bark tough, thick, dark green.

Lenticels.—Medium in number. Size on wood 8 to 10 years old, $\frac{3}{32}$ by $\frac{1}{2}$ to $\frac{3}{32}$ by $\frac{7}{16}$ inch. Gray, raised, oval, apexes acute. Crack longitudinally down middle. On young wood lenticels wide, oval, and very small.

Foliage.—Medium in density. Leaves medium in number on individual branches; inclined to curl.

Blade: Variable in size, average medium ($\frac{7}{8}$ by $2\frac{7}{8}$ inches; ratio of width to length about 2:7). Mostly ovate but frequently elliptical. Base obtuse to wide-acute. Apex acute and tapering. Margin with very shallow and long crenations; bristles fine and short.

Petiole: Varies in length and thickness, average length medium ($\frac{3}{4}$ inch; ratio of length of petiole to length of blade about 1:4). Grooves deep and narrow. Glands two to four, small dark yellow or yellowish gray, on petiole near blade.

Bearing habit.—Usually does not average well. Considerable number of sticktights, mostly on spurs on wood 2 to 4 years old. Many spurs compound and long (1 to 6 inches), frequently living two or three years. Single spurs medium in length ($\frac{1}{4}$ inch) and in stockiness ($\frac{1}{8}$ inch). Expand gradually to almost round or oval disk $\frac{3}{16}$ by $\frac{1}{4}$ inch. Buds free, medium sized, short, plump, conical, obtuse apex.

NUT

Immature nut.—Varies in size, usually rather small to medium ($1\frac{3}{8}$ by $\frac{7}{8}$ by $\frac{3}{4}$ to $1\frac{3}{4}$ by $1\frac{1}{8}$ by 1 inches). Shape oval or oval-ovate, with straight dorsal side. Ventral edge sharply curved, curving much at apex. Ridge none or very slight; ventral suture depression narrow ($\frac{1}{32}$ inch) and shallow ($\frac{1}{64}$ inch), deepest at apex and near disk; frequently hull at one side of suture more prominent than on other. Dorsal edge very slightly curved (axis near dorsal edge). Base plump, round, at right angles to axis or ventrally sloping; ventral shoulder round, plump, with suture line depressed near disk. Dorsal shoulder square, dropping off abruptly at a distance of about one-fourth inch from center of disk. Apex thin, tapering, but blunt, somewhat scimitar shaped, but dorsal edge never recurves; depressed along suture. Style adheres long (until dehiscence); rudiment very small and very pubescent.

Hull: Outer surface green, turning yellowish early, turns pinkish brown on ventral edge, this color finally spreading over the surface; surface frequently brownish red with pink splashes late in season; pubescence abundant, short, fine, gray, thick, felty. Inner surface of hull turns brown shortly after the hull opens and rapidly becomes light gray. Hull frequently brown when torn open before dehiscence starts. Dehiscence proceeds slowly along ventral edge, usually starting at base. Dorsal edge frequently cracks at base. Halves of the hull spread outward, the ventral edges rolling inward.

Hulled nut.—(Pl. V, *E.*) Size varies much, medium to large ($1\frac{1}{4}$ by $\frac{11}{16}$ by $\frac{7}{16}$ to $1\frac{1}{2}$ by $\frac{13}{16}$ by $\frac{9}{16}$ inches). Number of nuts to the pound, 180 to 220. Percentage of kernel to nut, 45.

Shape: Moderately plump, long ovate, tapering to a point at apex; long in proportion to width (viewed edgewise, long oval or ovate, with sharp thin apex and frequently unsymmetrical sides). Ventral edge most sharply curved at base, curving rather gently at apex; wing thin, extending entire length of ventral edge, ending in sharp long acute point at apex, varies in prominence, but usually not very prominent, least prominent at base, frequently depressed at base. Dorsal edge gently curving, almost straight in middle, curving inward near apex; dorsal edge plump, ridge narrow and of medium prominence. Base round and plump; stem scar small, wide, at right angles to axis or slightly sloping ventrally; dorsal shoulder abruptly rounding; ventral shoulder gently rounding, frequently sloping and depressed. Apex pointed; tip long, thin, and acute where wing ends and frequently scimitar shaped.

Shell: Soft, crumbly, light brown. Pits medium in number, roundish, large, and found on dorsal edge, as well as on sides; surface of shell stippled between pits. Ventral edge near base depressed as a rule. Base usually lacks grooves except on ventral edge. Grooves at wide angle to wing on ventral edge. Canals medium size, round. Fibers medium size. Inner shell thin, light brown in color, being a little darker than outer. Ventral streak light yellow brown; usually narrow; medium length; sides straight near base; base obtuse.

Kernel: A number of doubles (6 to 10 per cent). Large for size of nut ($1\frac{1}{8}$ by $\frac{1}{2}$ by $\frac{5}{16}$ inches), light brown in color, long ovate or elliptical, fairly plump. Ventral edge usually more curved than dorsal, sometimes very much more. Frequently a deep long depression present in side, due to tendency to form doubles. Some shrunken kernels. Base wide, ventral shoulder sloping. Dorsal shoulder rounding, elevated above ventral. Apex varies from scimitar shape acute to obtuse. Pellicle thick, tough; veins distinct when kernel is fresh; pubescence varies, usually thick and coarse; pellicle fold on apex half or apex third of nut; base scar very small and frequently indistinct. Flavor mildly sweet and attractive.

Distinguishing characteristics.—The following combination of features is helpful in distinguishing this nut from other varieties: Nut long, pointed, pits very large and round or irregular, stem scar small, wing not prominent, apex acute or scimitar shaped; kernels variable in size and usually heavily pubescent.

Classed according to shape, the Gilt Edge is in the group containing California, Jordan, Eureka, Favorite, and Sellers. It is distinguished from the Sellers by its somewhat harder outer surface, slightly shorter length, wider base, less pointed ends, and plump, shorter, and more cuneiform kernels. The Gilt Edge has a harder shell, much smaller and more numerous pits, and a less sharp and less recurved apex than the Favorite. The Eureka and California Jordan are easily distinguished from the Gilt Edge. (See descriptions of those varieties.)

COMMENTS

Although the nut and kernel are quite large, the variability in size of the nut and the heavy pubescence covering the kernel are points against it. It is one of the poorer varieties and should be eliminated from commercial orchards. It is grown much less than formerly.

29. GOLDEN NUGGET

Origin.—In 1896 a seedling tree came up on the W. I. Appleby ranch, Esparto, Calif. It received its name from the round shape of the nuts it bore. The variety has not been grown outside of the district where it originated. The original tree is still living.

Description

TREE

Upright with rather spreading top (ratio of width of head to height, $1:1\frac{1}{8}$). Vigorous, branches profusely, bushy. Trunk long, stocky; bark rough, with very deep cracks.

Main branches.—Medium in length, stocky, grow upright; scraggly; branches profusely. Branching angle acute. Wood brittle. Bark cherry brown, covered with thick silver-gray epidermis; rough on old branches, exfoliates in thick, large patches.

Twigs.—Medium long, rather slender. Branching angle acute. Nodes medium size. Internodes short ($\frac{1}{2}$ to 1 inch). Bark light green with some gray bloom; with dark reddish patches in autumn.

Lenticels.—Numerous. Size on 8 to 10 year old bark, $\frac{3}{32}$ by $\frac{1}{8}$ to $\frac{3}{32}$ by $\frac{5}{8}$ inch. Dark gray, raised; elliptical with tapering ends and acute or acuminate apexes.

Foliage.—Dense. Leaves on individual twigs numerous; many in clusters.

Blade: Average rather small ($\frac{5}{8}$ by 2 to 1 by $3\frac{1}{2}$ inches; average, $\frac{7}{8}$ by 3 inches; ratio of width to length, 2:7). Shape, ovate, but somewhat variable. Base quite obtuse; origin of sides symmetrical or slightly unsymmetrical. Apex long, tapering, acute or bluntly rounding. Margins with long and shallow serrations or crenations, bristles long and narrow. Main rib slender. Veins distinct; slightly elevated on under side. Upper surface of blade light green. Lower surface a little lighter than upper. Blade tends to be flat.

Petiole: Rather short to medium (average $\frac{3}{4}$ inch; ratio of length of petiole to length of blade, 1:4). Pale green, tinged with red on upper surface in autumn. Groove narrow and shallow. Glands two to four, commonly two or three, rather small, brownish, globular.

Bearing habit.—Bears well. Nuts borne mostly singly, but some in clusters; on spurs on wood 2 to 4 years old, mostly on wood 2 and 3 years old. Spurs medium in length ($\frac{1}{4}$ inch) and diameter ($\frac{1}{8}$ inch); expand suddenly to wide oval disk ($\frac{1}{4}$ by $\frac{1}{4}$ inch). Buds medium size, pointed conical; scales dark brown, large, thin, tough, with very small quantity of short pubescence.

NUT

Immature nut.—Plump. Short, wide oval, almost round. Ventral edge very much curved (in form of a circle); very slight ventral ridge; suture depression very narrow ($\frac{1}{32}$ inch) and shallow ($\frac{1}{64}$ inch). Dorsal edge curves less than ventral, curves most abruptly at apex; ridge present. Base very plump, round, sharply dorsally sloping; stem cavity $\frac{1}{4}$ to $\frac{5}{16}$ inch across, $\frac{1}{16}$ inch deep. Apex broad, round, plump; style stays on late; rudiment small.

Hull: Outer surface green, turning first yellowish brown and then grayish brown; pubescence thick, short, fine, gray, felty. Dehisces on ventral edge; spreads open at base; edges curve inward at apex; occasionally cracks in middle of dorsal edge. Ripens from August 20 to September 6.

Hulled nut.—(Pl. VI, *A.*) Medium size ($1\frac{1}{4}$ by 1 by $\frac{3}{4}$ inches). Number of nuts to the pound, 120 to 130. Percentage of kernel to nut, 35.

Shape: Plump, short and wide, quite globular; part on wing side of axis cordate; part on dorsal side of axis long oval or ovate; (viewed edgewise, nut is very wide in proportion to length, being very wide-ovate, or oval, almost round). Ventral edge very curving. Flange, quite thick, medium prominent to prominent. Dorsal edge invariably sloping at dorsal shoulder, rather straight in middle, sharply curving near apex; dorsal ridge wide, heavy, and prominent; dorsal suture usually distinct, or else fibers show entire length of dorsal edge. Base cordate in shape; very sloping from ventral to dorsal shoulder for some distance each side of stem scar; dorsal shoulder sloping and much below ventral shoulder; base end of nut very plump; stem scar very large and wide, always sloping very much dorsally. Apex very wide, obtuse, and plump, with a very small acute tip; sometimes wing is quite prominent at the apex; in other cases it is indistinct.

Shell: Usually very light grayish brown in color; hard. Pits deep, round, of various sizes. Exceedingly short grooves at base. Grooves on ventral edge of varying lengths running nearly parallel to the wing. Dorsal ridge with spongy fibers in its center. Outer and inner shell thick. Canals exceedingly large, long oval in shape. Fibers small for size of canals. Inner shell dark brown, thick, hard, with sharply undulating inner surface; much darker than color of outer surface of shell. Ventral streak usually long, very dark brown in color, exceedingly wide, apex bluntly tapering, base bluntly pointed, but tapering.

Kernel: Size medium ($\frac{7}{8}$ by $\frac{1}{2}$ by $\frac{5}{16}$ inch). Very many doubles (90 per cent of kernels are doubles or deformed kernels). Shape plump, short, wide at base end tapering abruptly to apex; gently curving sides, often irregular in shape; heavily wrinkled upon drying. Base round or pointed, varying much. Apex blunt. Pellicle tough, covered with heavy, short pubescence. Flavor excellent.

Distinguishing characteristics.—Plump, globular, ovate shape; very wide in proportion to length; very large proportion of double kernels; sharply dorsally sloping base; inner surface of shell darker than outer; very wide ventral streak, with bluntly pointed, tapering base.

COMMENTS

The flavor of the Golden Nugget is excellent. The nut is of no value commercially, however, on account of its hard shell and many double kernels.

30. GOLDEN STATE

Origin.—In 1877, Webster Treat, of Davis, Calif., accidentally left one of a number of small seedling trees in his Languedoc orchard. When the tree was 3 years old it bore a heavy crop, and when 8 to 10 years of age it averaged 45 pounds of nuts yearly. At that time Mr. Treat was very enthusiastic over the qualities of the nut and bearing habits of the tree. The tree was named the Golden State and the variety extensively propagated. It has been said that at one time Mr. Treat budded 60,000 nursery trees to the variety in a single season. It was for sale by nursery firms in California as early as 1890, and five years later practically every nursery in California propagated the variety. It was propagated in Australia as early as 1902 and sold in that country by at least seven nursery firms in 1905. The Golden State almond was planted widely in California, and although many of the original plantings of the variety have disappeared, it is still common in every section of the State and enters into the market in large quantities.

Description

TREE

Moderately spreading (ratio of height of head to width, $1:1\frac{1}{8}$). Vigorous. Trunk stocky; bark rough with cracks quite far apart and deep; exfoliates in thick flakes.

Main branches.—Long, slender, tend to curve. Branching angle widely acute. Wood rather tough with many knots. Bark smooth on young branches, rather rough on old branches; dark maroon brown, with gray epidermis; heavy striations common; exfoliates in rather large, thick flakes.

Twigs.—Usually rather short and slender; flexible; produced in profusion. Branching angle wide. Nodes large. Internodes medium in length (average, $\frac{1}{2}$ to 1 inch). Wood rather tough. Bark medium tough, light green, with considerable waxy bloom, tinged with red in autumn.

Lenticels.—Numerous, vary in size, average large (on bark 8 to 10 years old, $\frac{3}{32}$ by $\frac{5}{16}$ to $\frac{3}{32}$ by $\frac{5}{8}$ inch); raised, ash gray, elliptical with acute to short acuminate apexes. On young branches lenticels distinctly elliptical with acute apexes and gently curving sides.

Foliage.—Rather dense. Leaves somewhat variable in size, tend to curl and twist.

Blade: Somewhat variable in size, shape, and width ($\frac{3}{4}$ by $2\frac{1}{8}$ to $1\frac{1}{2}$ by $4\frac{1}{8}$ inches; average, $1\frac{1}{8}$ by $3\frac{5}{8}$ inches; ratio of width to length, about 2:7). Shape ovate or elliptical-ovate. Base generally obtuse, round; origin of sides symmetrical or nearly so. Apex generally acute, tapering. Margins crenate, crenations short and deep. Midrib medium in size, prominent. Upper surface of blade light green, frequently with a yellowish tinge; lower surface dull light green.

Petiole: Varies in diameter and length (average rather short, $\frac{3}{4}$ inch; ratio of length of petiole to length of blade, about 2:9). Pale green on lower surface, light green on upper, tinged with red in autumn. Groove usually narrow and rather deep. Glands two to four, commonly three or four, small, elevated oval, grayish brown. Glands on petiole near blade.

Bearing habit.—Erratic in bearing, especially as trees get old. Most nuts on wood 2 and 3 years old, but many also borne on laterals and on old wood. Nuts in pairs quite common. Spurs occasionally 2 years of age, bearing from side bud to second year; vary in diameter, usually rather thick ($\frac{3}{16}$ inch) and medium in length ($\frac{1}{4}$ inch); expand gradually to wide oval disk ($\frac{3}{16}$ by $\frac{1}{4}$ inch), which is only slightly larger than spur diameter. Buds free, very long, conical, tapering from base up, sharp pointed.

NUT

Immature nut.—Size medium to quite large ($1\frac{3}{4}$ by $1\frac{1}{4}$ by 1 inches). Shape irregular oval; part to ventral side of axis oval or slightly ovate; part to dorsal side of axis, long, oblong ovate. Ventral edge much curved; smooth or with very slight ridge; suture depression very shallow ($\frac{1}{64}$ to $\frac{1}{32}$ inch); narrow ($\frac{1}{16}$ inch). Dorsal edge nearly straight, curving suddenly at apex; tendency to be slightly ridged. Base curved and scalloped slightly; bluntly constricted; ventral shoulder sloping; dorsal shoulder square, but not prominent. Cavity $\frac{1}{4}$ inch wide and $\frac{1}{32}$ to $\frac{1}{16}$ inch deep. Apex bluntly pointed, with dorsal edge sharply rounding and ventral edge sloping and slightly curved; suture depression deeper at apex on ventral side of rudiment than elsewhere; style drops early as a rule; rudiment quite small, pubescent.

Hull: Outer surface green, many times with pink splashes; turns yellowish as dehiscence proceeds; pubescence very abundant, short, fine, gray, felty. Inner surface nearly white as it starts to dehisce, soon turning brown. Usually dehisces on ventral edge only; halves open equally or unequally, some dehisce on dorsal edge also; cracks may appear at various places on hull. Ripening date, August 8 to September 5, depending on season and locality.

Hulled nut.—(Pl. VI, *B.*) Size average medium ($1\frac{3}{8}$ by $\frac{7}{8}$ by $\frac{5}{8}$ inches). Number to the pound, 200 to 260. Percentage of kernel to nut in hand-cracked samples, 35 to 40.

Shape: Moderately plump; rather long ovate with straight dorsal side (viewed edgewise, long ovate, sides usually symmetrical). Ventral edge gradually and evenly curved, curving most at apex and base; wing rather thick and of medium prominence, distinct, lacking in prominence at apex. Sides curving to wing rather abruptly. Dorsal edge very gently curving, curving sharply at immediate apex; dorsal ridge narrow to medium, medium prominent, and usually of same texture as shell on each side of it. Base plump and rather truncate, but sometimes round; dorsal shoulder rather square, but lacks prominence, sloping immediately from stem scar; ventral shoulder curves sharply and evenly; stem scar small to medium, short and wide, frequently round, usually very slightly depressed; at right angles to axis or sloping very slightly either dorsally or ventrally. Apex tapering gradually to tip of nut. (Viewed edgewise the lower half of the nut has a tendency to be cuneiform in appearance.) Extreme apex rather blunt with short acute tip to wing.

Shell: Medium brown; hardness varies, can sometimes be crushed with fingers, sometimes not; just within the soft-shell class, frequently much harder. Pits numerous, deep, of varying sizes and shapes, but mostly small and round. Shell between pits marked with shallow indentations of about the size of pits. Outer shell of medium thickness; frequently spongy, but not always. Short grooves oblique to wing on both sides and around stem scar on base. Canals large, round. Network coarse. Fibers large. Inner shell hard and quite thick. Inner surface sharply undulating, especially near apex; lighter brown in color than outer surface. Ventral streak dark brown, medium to long, medium in width, with sides slightly wavy, seldom clear cut and straight; narrows from middle gradually to acute apex and to base where dark-brown part ends in bluntly rounding point, usually continued for a short distance toward base in lighter brown color than rest of streak.

Kernel: Size variable, averages medium ($\frac{7}{8}$ by $\frac{1}{2}$ by $\frac{5}{16}$ inch). A number of doubles (9 per cent). Shape plump, ovate. Dorsal edge usually straight. Ventral edge slightly curved; sharply curved at shoulder. Base fairly plump; ventral shoulder sloping, but gradually curved; dorsal shoulder sharply rounding. Apex varies from blunt to acute, usually quite plump. Pellicle dark brown, thick, tough; pubescence considerable, coarse, short; pellicle fold prominent on apex half of ventral edge; base scar dark in color, medium size, short and wide. Kernel wrinkles much upon drying. Quality fair, sweet.

Distinguishing characteristics.—On account of slight variations, this widely grown variety is difficult to distinguish from many others. It is classified according to shape with the Brown, Cartagena, Concord, Fairoaks, Rice, Routier, and several unnamed California seedlings. (For points of difference between it and Brown, Cartagena, Concord, and Fairoaks, see description of distinguishing characteristics of those varieties.)

The shell of the Golden State is harder than in the Rice, is darker in color, and the apex is much more blunt.

The Golden State nut closely resembles the Routier. In the Golden State the apex of the nut is more tapering, the shell has many more pits, the kernel is more plump, especially at the base, is much shorter, usually smaller, with a much more cuneiform apex, and somewhat more pubescence on the pellicle.

COMMENTS

Although this nut is still widely grown, it is gradually disappearing. Its rather erratic bearing habit, the tendency of the nuts to be small, the dark-colored shell, the considerable percentage of double kernels, the many sticktights in some seasons, and the tendency in other seasons to drop many of the nuts from the tree while dehiscing before all the nuts are ready to harvest are points which have brought it into disfavor. It should be replaced by better varieties.

31. GORDON

Origin.—Originated in the Gordon Valley, Solano County, Calif. At the present time there are no large orchards of the variety.

Description

TREE

Spreading (ratio of height of head to width, $1:1\frac{1}{3}$). Medium in size. Trunk varies in stockiness; inclined to be stocky and rather long; tends to branch profusely; bark rough but variable in this regard, exfoliates in large plates.

Main branches.—Rather long and stocky, tend to originate in whorls and to grow horizontally. Branching angle wide. Wood soft and brittle. Bark usually smooth, but varies much, grayish, and on young branches often silvery.

Twigs.—Medium in length, rigid. Branching angle wide. Tend to grow straight. Nodes quite large. Internodes short (1 inch or less). Bark smooth, green, tinged with rusty red in autumn, often with bloom.

Lenticels.—Very numerous. Variable in size (on bark 8 to 10 years old, $\frac{1}{16}$ by $\frac{1}{8}$ to $\frac{1}{8}$ by $\frac{1}{2}$ inch). Shape wide elliptical, ends bluntly acute, sometimes sharply acute, crack through middle, raised, gray. On twigs lenticels are small, numerous, greenish gray.

Foliage.—Dense. Leaves numerous on individual branches, thick, coriaceous, and tend to remain flat.

Blade: Average small (about $\frac{3}{4}$ by $2\frac{3}{4}$ inches; ratio of width to length, 2:7). Shape variable; ovate or elliptical. Base blunt; origin of margins usually unsymmetrical, but sometimes symmetrical. Apex acute or bluntly acute. Margin coarsely and irregularly crenate with tendency to be serrate at base; bristles short and wide. Midrib large and often slightly depressed on upper surface. Veins large, slightly raised on under surface. Upper surface rich glossy green. Lower surface very dull green, lighter than upper.

Petiole: Stocky, medium to rather long ($\frac{3}{4}$ to 1 inch; ratio of length of petiole to length of blade, average 2:7). Very pale green. Groove very deep and narrow. Glands 2 to 12; pairs often opposite or nearly so, grayish green, dusty red in autumn; basal pair frequently slightly stipulate.

Bearing habit.—On spurs, mostly on wood 2 and 3 years old. Often a few on older wood. Nuts often in pairs. Spurs medium in length, exceedingly stocky; expand gradually to large, wide oval disk. Buds short, plump, constricted at base, free, apex often blunt; scales tough, hard, deep brown, pubescent on edges.

NUT

Immature nut.—Medium in size. Shape oblong oval. Ventral edge gently curved; never with ridge. Dorsal edge quite straight at base, curving suddenly at apex. Base truncate. Apex truncate; style long, adhering late in season.

Hull: Outer surface bumpy, green, turning light yellowish green while dehiscing; often pink on edges; pubescence short, fine, woolly, gray. Inner surface light green to brown. Dehisces on ventral edge only; often portions of shell come off with hull. Ripens August 1 to 30.

Hulled nut.—(Pl. VI, *C.*) Size small to medium (average, 1¼ by ⅞ by $\frac{9}{16}$ inches). Number to the pound, 225 to 250. Percentage of kernel to nut in hand-cracked samples, 44.

Shape: Ovate (viewed edgewise, rather long oval, with base frequently tapering, and widest part nearer end than base). Ventral edge sharply curved. Wing thin; medium in prominence, usually least prominent at base and most prominent near apex. Dorsal edge varies in curve, usually medium, always curved near apex, sometimes straight at middle portion. Base usually round; ventral shoulder slightly sloping; dorsal shoulder a little higher than stem scar; dorsal ridge not prominent except at shoulder; stem scar very small, oval, somewhat ventrally sloping. Apex thin, rather obtuse, but has a small point formed by the wing. Viewed edgewise the apex is usually thin, rather long, and pointed or cuneiform.

Shell: Outer surface light to dark brown. Pits very numerous and small. Short grooves at base and along ventral edge. Outer shell very soft and spongy. Shell gets harder as tree gets older. Varies much. Canals and fibers medium in size. Inner shell very thin and hard, light brown. Inner surface usually corrugated longitudinally with few shallow corrugations. Ventral streak, medium in length, rather narrow, tapering gradually to apex, tapering from middle to base, which is acute, with slightly rounding point; usually light brown, slightly lighter in color than rest of inner surface of shell; two sharp ridges usually present each side of streak.

Kernel: Size medium (⅞ by ½ by ¼ inch). Some doubles (10 per cent). Flat, ovate. Ventral edge more plump and less curved than dorsal. Base round to round-truncate. Dorsal shoulder slightly sloping to square, being higher than ventral shoulder and thin. Ventral shoulder rounds off suddenly. Apex fairly plump. Kernel wrinkles much in drying. Pellicle, thin, tough, short; pubescence thick, short; pellicle fold prominent throughout apex third of ventral edge; base scar small, round, or oval. Flavor good, slightly nutty, sweet.

Distinguishing characteristics.—Resembles the I. X. L. somewhat in shape, but is easily distinguished from it. Shell is heavier and more spongy, pits smaller and more numerous, wing less prominent, base of ventral streak light brown instead of dark brown; and the kernel is narrower and smaller.

The Gordon nut resembles closely the Grosse Tendre and Hampton in shape, but the stem scar slopes ventrally in the former. The Gordon kernels are without the crease in the sides, which is characteristic of the Hampton and Grosse Tendre.

COMMENTS

This nut is often marketed as I. X. L. It has a considerable number of doubles, is in general inferior to the I. X. L. and several other varieties, and as it has no merit not possessed by the Hatch varieties it is not recommended for planting. The tree is especially susceptible to disease, such as apricot brown-rot.

32. GROSSE TENDRE (IMPROVED LANGUEDOC)

Origin.—Introduced from France by Felix Gillet, of Nevada City, Calif. The variety was listed for sale in his nursery catalogues as early as 1888. It was planted to some extent in a number of districts in the State and is still grown on a commercial scale in the Chico-Durham district.

Description

TREE

Spreading (ratio of height of head to width, 1:1¼). Scraggly, willowly. Branches profusely. Trunk medium stocky; bark rough, cracks close together; exfoliates in thick plates.

Main branches.—Medium long; slender; scraggly, much like Drake. Branching angle moderately acute. Wood brittle. Bark brownish red or yellowish red; rough on old branches; exfoliates in coarse flakes.

Twigs.—Moderately short, slender, willowy, flexible. Bark thick, tender, brittle; green, turning reddish in autumn; with much bloom.

Lenticels.—Exceedingly large (on bark 8 to 10 years old, $\frac{3}{32}$ by $\frac{3}{4}$ to $\frac{1}{4}$ by $1\frac{1}{4}$ inches); very much raised, gray, rough, many cracks, wide, long-elliptical or oblong-elliptical; apexes acuminate except on young wood. On young bark lenticels very much raised, gray, conspicuous. (See Pl. XVI, *D.*)

Foliage.—Moderately dense; has feathery, willowy appearance. Leaves rather large; roll up slightly along midrib, recurve.

Blade: Rather large ($\frac{3}{4}$ by $2\frac{1}{2}$ to 1 by $4\frac{1}{4}$ inches; average, $\frac{7}{8}$ by $3\frac{3}{8}$ inches; ratio of width to length, about 1:4). Shape narrow-ovate or elliptical-ovate; widest part near middle as a rule. Base, bluntly obtuse; origin of sides symmetrical or nearly so. Apex tapering; tip usually acute, but sometimes blunt. Margin frequently irregular; crenations irregular, very short, deep; bristle short, sharp, dark. Midrib rather slender; pale in color; very prominent; slightly depressed on upper surface. Veins distinct; much elevated on under surface. Upper surface blade very glossy, light yellowish green; under surface light green and dull.

Petiole: Varies much in thickness and in length ($\frac{1}{2}$ to $1\frac{1}{3}$ inches long; average rather short, $\frac{3}{4}$ inch; ratio of length of petiole to length of blade, about 2:9). Bright green, tinged with light red in autumn. Glands two to six, commonly three or four, dark brownish, oval, on upper part of petiole near base of blade.

Bearing habit.—Somewhat of an alternate bearer, with much variation in type of shell, i. e., when crop is heavy, shell is hard; when crop is light, shell is soft. Bears on spurs on growth 2 to 4 years old. Spurs large in diameter ($\frac{3}{16}$ inch), medium in length ($\frac{1}{4}$ inch), disk very large, wide oval ($\frac{5}{16}$ by $\frac{3}{8}$ inch). Buds free; very large; constricted somewhat at base, plump in middle; apex bluntly tapering; scales grayish brown, moderately thick, brittle, with large amount of long, gray pubescence on edges and some on outside of scales.

NUT

Immature nut.—Medium to rather large (average $1\frac{3}{4}$ by $1\frac{1}{4}$ by 1 inches). Ovate; part on ventral side of axis ovate; part on dorsal side long oval, or obovate. Ventral edge curved most along base half; gently curved or almost straight at apex; ventral ridge wide ($\frac{1}{4}$ inch) and not prominent ($\frac{1}{16}$ inch); suture crease shallow ($\frac{1}{64}$ inch). Dorsal edge gently curved, most curved at apex. Base broad, much dorsally sloping, finely grooved and ridged with very short grooves. Apex tapering and round, pointed; rather straight on ventral side, rounding on dorsal; style drops quite early; rudiment small.

Hull: Outer surface green, changing to yellow green; turning dark brown on ventral edge soon after dehiscing; dries from ventral edge dorsally. Pubescence moderately abundant, gray, very short, very fine, silky. Inner surface green when first opening, but turns brown rapidly. Dehisces along ventral suture, usually from base downward; dorsal edge remains intact, but sometimes cracks at base. Halves curl outward, one side usually curling more than the other. Ripens August 12 to 24.

Hulled nut.—(Pl. VI, *D.*) Size medium to quite large (average $1\frac{1}{2}$ by $1\frac{1}{16}$ by $\frac{3}{4}$ inches). Number to the pound, 110 to 200. Percentage of kernel to nut, hand-cracked, 35.

Shape: Quite plump, wide ovate, with rather straight dorsal edge; the part on ventral side of axis cordate (viewed edgewise, long ovate, with apex half tapering rapidly; sides sometimes curve in at apex). Ventral edge one-fourth longer than dorsal; curve clear cut, gradually increasing from near shoulder to apex; wing prominent, thin, runs from stem scar to apex, where it ends prominently in a point. Dorsal edge gently curving, most curving at apex; dorsal ridge medium prominent, wide. Base quite plump, wide, sloping dorsally; dorsal shoulder usually begins to slope after leaving stem scar; ventral shoulder somewhat higher than dorsal, running out square on level with stem scar for a short distance, then rounding suddenly. Apex somewhat pointed; usually rather thin; wing ends in prominent point at apex; stem scar medium in size, oval and slightly depressed, dorsally sloping.

Shell: Dark brown; varies much in hardness with crop; is much harder when crop is heavy than when it is light. Pits numerous, small to medium sized, roundish; surface between pits stippled. Short numerous grooves at base and on ventral edge oblique to wing. Outer shell medium thick and heavy. Canals large oval to round. Network fine. Fibers coarse. Inner shell medium thick and hard. Inner surface light brown in color, lighter than outer and somewhat wavy longitudinally. Ventral streak long, wide, tapering from middle both ways, its shape being oval, apex acute, base tapers to acute point.

Kernel: Doubles numerous (30 to 40 per cent). Size large ($1\frac{1}{16}$ by $\frac{5}{8}$ by $\frac{3}{8}$ inches). Shape rather flat, sides ovate, with widest portion near base, tendency of lower two-thirds to be cuneiform, sides gently curving. Ventral edge thick. Dorsal edge thin. Ventral shoulder sharply rounding. Dorsal shoulder square and sloping, sharp curve occurring at a point slightly below the level of the base scar. Apex thin and pointed. Pellicle reddish, medium thick, medium tough, usually smooth at base, increasing in pubescence toward apex; slight pellicle fold on lower half of apex; base scar medium in size, dark brown, and usually oval; veins distinct. Owing to tendency to form doubles, there is usually a deep longitudinal depression on side of kernel. Flavor good, pleasantly sweet.

Distinguishing characteristics.—The Grosse Tendre nut, occasionally mistaken for the I. X. L., is easily distinguished from the latter by the following: In the Grosse Tendre the base is wide and always dorsally sloping, the nut is narrower in proportion to its length and more pointed at the apex, the pits are more numerous, and the shell is harder and darker in color.

The Grosse Tendre is distinguished from the Gordon by the points given under that variety.

The Grosse Tendre resembles the Hampton in nearly all its details. The apex of the nut appears slightly less tapering in the Grosse Tendre, and there is slightly less pubescence on its pellicle.

COMMENTS

This variety blooms very late. It is, however, an alternate bearer, the shell being hard when the crop is heavy and soft when the crop is light. The large percentage of double kernels is a disadvantage. The quantity of nuts of this variety grown is not large.

33. HAMPTON (HAMPTON'S SEEDLING, HAMPTON'S IMPROVED I. X. L.)

Origin.—Originated on the J. M. Hampton ranch, Live Oak, Calif., in 1908. The variety was distributed to some extent in the Live Oak district. In the last few years many of the Hampton trees have been top-worked to other varieties, and the acreage at this time is small.

Description

TREE

Spreading (ratio of height of head to width, 1 : $1\frac{1}{4}$). Vigor below average; scraggly, somewhat like Drake. Branches profusely. Trunk slightly below average in vigor, tends to grow crooked; bark rough, cracks quite deep, exfoliates in thick plates.

Main branches.—Short; rather stocky. Branching angle wide. Wood brittle. Bark rough except on young branches; reddish brown; much gray epidermis even on young branches.

Twigs.—Short, stocky, nodes large, internodes short ($1\frac{1}{4}$ to $\frac{3}{4}$ inches). Wood brittle. Bark thick, tender, green, with red patches in autumn.

Lenticels.—Very numerous. Size (on 8-year-old wood, $\frac{1}{16}$ by $\frac{3}{16}$ to $\frac{1}{16}$ by $\frac{5}{16}$ inch). Raised, small, wide; elliptical; ends bluntly acute. On twigs lenticels numerous, grayish green.

Foliage.—Rather dense. Leaves numerous; many in clusters on spurs; leaves tend to twist slightly when mature, although many remain flat.

Blade: Average large, many small ones present ($\frac{5}{16}$ by $2\frac{1}{4}$ to $1\frac{1}{2}$ by 4 inches; average, $1\frac{1}{16}$ by $3\frac{1}{2}$ inches; average ratio of width to length, about 2 : 7). Shape wide ovate, apex half tapering. Base acute to very blunt; origin of margins usually symmetrical. Apex acute. Margin very shortly and deeply crenate; frequently doubly crenate. Midrib pale, large, prominent. Veins distinct, elevated on lower surface. Upper and lower surfaces light green.

Petiole: Length medium (1 inch, ratio of length of petiole to length of blade, 2 : 7). Groove medium wide and usually deep. Glands, commonly two; frequently three or four, brownish, small, globular.

Bearing habit.—Alternate bearers, but average well. Produce many sticktights as trees get older. Bears on spurs on wood 2 and 3 years old as a rule, but some nuts are borne on laterals. Many nuts in clusters. Spurs large in diameter ($\frac{3}{16}$ inch) and medium in length ($\frac{1}{4}$ inch); expand gradually to wide oval disk ($\frac{1}{4}$ by $\frac{5}{16}$ inch). Buds short, conical, apex rather blunt; scales dark brown, quite thick, tough, small, with pubescence on edges.

NUT

Immature nut.—Large ($2\frac{1}{4}$ by $1\frac{1}{2}$ by $1\frac{1}{4}$ inches). Plump. Ovate. Ventral edge curves most throughout base half; gently curved at apex; ventral ridge wide ($\frac{5}{16}$ inch), prominent ($\frac{1}{8}$ inch); grooves very shallow; suture crease distinct in middle of ridge. Dorsal edge gently curved, curve abrupt at apex. Base plump, broad, round, grooved, dorsally sloping; cavity $\frac{1}{16}$ inch deep, $\frac{5}{16}$ to $\frac{1}{2}$ inch across. Apex tapering, pointed, cuneiform.

Hull: Outer surface green, turning to yellowish brown in ripening; frequently with shallow depressions; pubescence moderately abundant, medium long, gray, woolly. Inner surface almost white, gradually turning brown as dehiscence proceeds. Dehisces on ventral edge first, halves curving outward at base and inward at apex; usually but not always, dorsal edge dehisces its entire length from base downward, dividing hull into halves. Many sticktights as trees get older. Ripens August 12 to 24.

Hulled nut.—(Pl. VI, *E.*) Size large ($1\frac{5}{8}$ by $1\frac{1}{4}$ by $\frac{7}{8}$ inches). Number to the pound, 65 to 100. Percentage of kernel to nut in hand-cracked samples, 36.

Shape: Moderately plump, medium wide; part on wing side of axis cordate; part on dorsal side of axis ovate (viewed edgewise ovate with narrow-pointed apex). Ventral edge very plump; varies in curve, but curves rather sharply; less curved near apex than elsewhere; sharpest curve near base; wing, rather thin, medium in prominence, most prominent near apex. Dorsal edge usually straight near base, curving sharply at apex; sides slope abruptly to wide, medium prominent dorsal ridge. Base either plump or quite thin, sloping dorsally; ventral shoulder rounding sharply, wide, higher than dorsal shoulder; dorsal shoulder slopes or rounds off suddenly; stem scar large, long, slightly depressed, gently but distinctly dorsally sloping. Apex thin, acutely pointed.

Shell: Dark brown; standard shell, varies in thickness and hardness. Pits numerous, variable in size and depth. Surface stippled between pits. Short grooves on ventral edge, running oblique to wing. Outer shell quite thick; either spongy or hard. Inner shell medium thick and hard. Canals very large, usually round in section. Fibers very coarse. Network medium coarse. Inner surface of shell light brown, having undulations longitudinally. Ventral streak light or dark brown, long, varies in width; base end pointed.

Kernel: Large ($1\frac{1}{4}$ by $\frac{11}{16}$ by $\frac{5}{16}$ inches). Shape flat, obovate, resembles I. X. L. much in shape, but is usually thicker and has many doubles (35 per cent). Single kernels have longitudinal depression on one side. Ventral edge plump, straight, and much shorter than dorsal edge. Dorsal edge thinner than ventral. Dorsal shoulder thinner than ventral, sloping, and humped. Ventral shoulder higher than dorsal. Apex rather thin, bluntly pointed. Pellicle light to dark brown, thick, medium tender; veining distinct and dark brown; base scar quite round and large; pellicle fold prominent on apex half; pubescence varies; usually coarse and thick, especially on apex and ventral edge; base frequently smooth. Flavor rather flat, slightly sweet.

Distinguishing characteristics.—This nut is in a class with Gordon and Grosse Tendre. For points of difference, see those varieties.

COMMENTS

This nut is inferior to the I. X. L. and other Hatch varieties. Its shell is harder, and there is a large percentage of double kernels. The variety is rapidly disappearing.

34. HARRIOTT (COMMERCIAL, HARRIOTT'S SEEDLING)

Origin.—This variety is often incorrectly called Commercial. The Harriott originated near Visalia, Calif., at some time between 1870 and 1875. It was planted to a limited extent in nearly every section, but is now found only occasionally.

Description

TREE

Large; moderately upright (ratio of width of head to height, 1:1). Very vigorous. Trunk very stocky; bark rough, exfoliates in thick patches.

Main branches.—Long, stocky, tend to grow upright. Branching angle moderately acute. Wood somewhat brittle. Many knots. Bark very rough and deeply cracked on old branches. Under bark grayish brown; outer layers ash gray, giving the older branches a distinctly gray color; exfoliates in heavy patches on old wood and in thick small flakes on young branches. Young branches usually gray in color.

Twigs.—Produced profusely. Moderately long and slender. Rigid. Branching angle moderately acute. Wood brittle. Nodes medium in size. Internodes short to medium (½ to 1 inch). Bark thick, tough, bright light green, with heavy, waxy, gray bloom; dark patches present in fall.

Lenticels.—Numerous, small (on 8 to 10 year-old wood, 1/32 by 3/16 to 3/16 by ½ inch), wide, short, elliptical with bluntly acute or short acuminate ends, raised, dull gray, quite rough, longitudinal cracks in center. On smaller branches lenticels are wide, oval, much raised, dark gray; very numerous on twigs.

Foliage.—Dense. Leaves very large; frequently wavy, twisty, curved, or rolled up along midrib. Retains leaves late.

Blade: Large, but many small ones present (size 1¼ by 3 to 2 by 4½ inches; average, 1¾ by 4 inches; ratio of width to length, about 2:5). Shape wide ovate, elliptical, or obovate; generally wide ovate. Base somewhat truncate, broadly round, or widely acute to obtuse; origin of sides either symmetrical or unsymmetrical; short stipules are common and usually occur singly. Apex tapering and acute or bluntly acute, but sometimes bluntly round at tip. Marginal crenations short and rather shallow, but somewhat variable, frequently deep and long near base of blade; bristles usually short and fine. Main rib rather large, prominent, and usually pubescent. Veins very distinct; large veins usually elevated on upper surface. (This characteristic is more marked in this variety than in any other.) Upper surface light green; lower surface dull and lighter in color than upper.

Petiole: Thick and short (average length, ¾ inch, but vary somewhat; ratio of length of petiole to length of blade, about 1:5). Pale yellowish green. Groove usually wide and shallow. Glands two to four, usually two, globular, medium sized, yellowish, frequently stipulelike, one or two basal crenations frequently glandular.

Bearing habit.—Mostly on wood 2 and 3 years old. Considerable number of nuts borne on laterals as well as on spurs. Spurs medium in thickness (⅛ inch) and length medium (¼ inch); expand gradually to form round disk one-fourth inch in diameter. Buds free, very large, long, plump in middle; scales medium in size, brown, rather thick, tough, bluntly pointed with much heavy pubescence.

NUT

Immature nut.—Large (2 by 1¼ by 1 inches). Shape long, plump, oval; part on ventral edge of axis long, oval; part on dorsal edge oblong. Ventral edge gently curved, usually quite straight at base, and most curved at apex; generally full and smooth, but sometimes has slight ridge; suture depression very shallow and narrow, usually a mere line, extending a short distance to dorsal side of rudiment. Dorsal edge rather straight, curved most at apex as a rule. Base tapering from middle of nut upward, pointed; ventral shoulder very sloping and straight, depressed; cavity very shallow. Apex slightly tapering and round, slightly depressed, with almost straight dorsal edge; style drops rather late; rudiment quite large. Outer surface of hull green; pubescence very abundant, short, fine, gray. Dehisces on ventral edge only, edges tend to roll inward. Ripens August 15 to September 30. Irregular in ripening, the same tree having green nuts not even started to dehisce while others are in the late ripening stage ready to be harvested.

Hulled nut.—(Pl. VII, *A.*) Size rather large, varies on same tree (1⅞ by 13/16 by ½ to 2 by ⅞ by ⅝ inches). Number to the pound, 125 to 180. Percentage of kernel to nut in hand-cracked samples, 45.

Shape: Rather plump, very long, narrow-ovate (viewed edgewise, long ovate or long oval; sides sometimes unsymmetrical). Ventral edge curved gradually; frequently rather straight at base, most sharply curved at apex.

Wide longitudinal groove common on ventral edge. Wing thin, quite prominent, running entire length of ventral edge, most pronounced at apex, where it rounds off suddenly, forming blunt apex, least prominent at base. Ventral edge sometimes bulging at middle, giving the edge a curve at that point like the Rock type Jordan. Dorsal edge rather straight, curving most at immediate apex and base; dorsal ridge of medium prominence, narrow. Base varies in plumpness; stem scar at right angles to axis or sloping either ventrally or dorsally; dorsal shoulder slightly rounding; ventral shoulder gently rounding, frequently flat, sloping, and depressed. Apex bluntly pointed. (Viewed edgewise it may be plump or cuneiform.) Wing long and thin.

Shell: Soft, often crumbly. Outer shell thin and usually light yellowish brown in color. Pits medium to numerous, quite round and deep, present close up to base scar. Surface between pits stippled or finely lined. Ventral edge has short grooves or depressions near base. Inner shell hard and thick. Canals quite round, medium size, and quite close to surface of outer shell, on account of thickness of inner shell. Fibers large in size. Inner surface of shell light brown; wavy or with shallow depressions. Ventral streak dark brown, wide, short to medium in length, long ovate or cuneiform, widening to the base, where it is very blunt and wide.

Kernel: Seldom any doubles (1 per cent); creases in one side indicate tendency to form doubles. Size large (1¼ by ⅝ by 7/16 inches or larger); long ovate or oval, widest at middle, with very sloping, flat, ventral shoulder sloping almost to middle of nut, with base scar well down middle of slope. Ventral edge much curved from base scar to apex, wide, plump, flat near base, gets thinner near apex. Dorsal edge straight, thin, shorter than ventral. Dorsal shoulder humped very much, sharply rounding, and is above base scar farther than in most other varieties. Ventral shoulder very slanting. Apex rather thin and blunt. Pellicle thick, medium, tough; pubescent at apex; frequently smooth at base, but not always; slight pellicle fold on apex half of ventral edge; base scar round or oval; veins usually distinct. Flavor rather dry, slightly sweet, rather flat.

Distinguishing characteristics.—This nut is easily distinguished from all other nuts as follows: Size large; shape very long, narrow, plump; both apex and base tapering and pointed, base depressed on ventral edge and usually more tapering than apex; shell light in color; pits exceedingly large. Easily distinguished from Gilt Edge by the scimitar-shaped apex of the latter.

COMMENTS

The Harriot tree is beautiful and thrifty in growth. The nut is large and attractive. It is one of the earliest almonds to blossom, starting in late January and blooming over a considerable length of time, frequently until February 20. The variability in the time of ripening of nuts, even on the same tree, and its tendency to produce sticktights are points against it. The variety has largely disappeared from commercial orchards, principally because of its early-blooming habit, which makes it especially liable to frost injury.

35. HENLE (HENLE'S DOUBLE-SHELL)

Origin.—A seedling tree said to have originated on the Henle ranch, at Davis, Calif., in 1909. It is not commercially important at the present time.

Description

TREE

Spreading (ratio of height to width of head, 1:1); rather open. Vigorous. Trunk stocky; tendency to grow crooked; bark rough, cracks far apart; exfoliates in large, thick patches.

Main branches.—Straight, moderately long, medium stocky. Branching angle widely acute. Wood tough. Bark thick and rather brittle; yellowish brown; small patches of gray epidermis; striated on young branches; exfoliates in small, thin flakes.

Twigs.—Quite long, stocky, rigid, wood tough. Branching angle moderately acute. Nodes small. Internodes long (½ to 1¾ inches). Bark medium deep green, turning reddish brown in patches in the fall, with much bloom.

Lenticels.—Numerous; medium to rather small in size (on bark 8 to 10 years old, $\frac{3}{32}$ by $\frac{3}{16}$ to $\frac{3}{32}$ by $\frac{1}{4}$ inch), grayish brown, raised, short and wide, elliptical, with blunt ends. Lenticels on young bark, medium size, wide oval, raised, gray; frequently obscured by gray epidermis.

Foliage.—Top of tree rather open. Leaves on individual branches medium in number, large, flat.

Blade: Large, width varies ($\frac{3}{4}$ by $2\frac{3}{4}$ to $1\frac{3}{8}$ by $5\frac{1}{4}$ inches; average, $1\frac{1}{8}$ by $3\frac{3}{4}$ inches; ratio of width to length, about 2:7). Shape wide ovate. Base bluntly round, sometimes bluntly acute; origin of margins generally symmetrical. Apex bluntly acute and tapering. Margins frequently curving inward at apex; coarsely crenate. Main rib large, prominent, very light in color. Veins distinct and usually elevated on lower surface. Color of upper surface smooth, glossy, light green; lower surface dull light green, of nearly the same color as the upper.

Petiole: Short to medium (average, $\frac{7}{8}$ inch). Ratio of length of petiole to length of blade, about 1:4; stocky; flexible; lower surface light green; upper surface dark green, occasionally tinged with red in autumn. Groove deep and narrow. Glands generally two, sometimes three; medium size, globular, dark brown, on petiole near base of blade; occasionally one basal crenation is glandular.

Bearing habit.—Rather light bearer. Nuts in clusters on spurs mostly on wood 2 and 3 years old; a considerable number also borne on laterals. Spurs long ($\frac{1}{4}$ to $\frac{3}{8}$ inch); diameter large ($\frac{1}{8}$ to $\frac{1}{4}$ inch); expand gradually to wide oval disk ($\frac{3}{16}$ by $\frac{1}{4}$ inch). Buds moderately free, very long, large, tapering, sharp pointed, compressed laterally; scales dark yellowish brown, thin, tough, rather large, with a very small amount of fine, short pubescence on edges.

NUT

Immature nut.—Size medium to rather large ($1\frac{3}{4}$ by $1\frac{3}{8}$ by 1 inches). Shape ovate, axis close to middle. Edgewise view ovate, frequently with cuneiform apex. Ventral edge usually curves most along base half; ridge $\frac{1}{4}$ inch wide and $\frac{1}{16}$ inch high; parallel grooves each side of ridge. Suture depression usually shallow, slightly depressed at apex. Base slightly grooved, broad, round, at right angles to axis; small cavity $\frac{1}{64}$ inch deep, $\frac{1}{4}$ inch wide. Apex broad, round, or very bluntly cuneiform; style drops early; rudiment small. Outer surface of hull green, with bumps and depressions; pubescence very abundant, very coarse, medium long, gray, felty.

Hull: Dehisces along both ventral and dorsal edges as a rule, but many dehisce on ventral edge only. Frequently hull cracks crosswise on apex. Many sticktights. Ripens August 25 to September 20.

Hulled nut.—(Pl. VII, *B.*)—Size medium (average, $1\frac{1}{2}$ by 1 by $\frac{3}{4}$ inches). Number to the pound, 140 to 200. Percentage of kernel to nut in hand-cracked samples, 50.

Shape: Medium plump, wide ovate; axis one-third of way from dorsal to ventral edge. Ventral edge much curved; flange of medium width, not prominent to medium prominent. Dorsal edge much curved, but not so much as ventral edge, curved most near apex; ventral ridge medium prominent, medium wide. Base rather plump, wide; dorsal shoulder sharply rounded, gently sloping; ventral shoulder rounded sharply; stem scar large, wide oval, dorsally sloping, or at right angles to axis. Apex blunt, rounded, or very bluntly pointed.

Shell: Soft; outer shell medium thick, very spongy and crumbly. Outer surface light grayish brown. Pits numerous, small, mostly round, varying in depth. Short oblique grooves on ventral edge. Canals small, numerous, oval. Inner shell thin, hard; inner surface light brown, undulating. Ventral streak dark brown, medium in length and width, base half tapering, base end sharply rounded or acute.

Kernel: Medium size to quite large (average, 1 by $\frac{1}{2}$ by $\frac{5}{16}$ inch). Many doubles (50 per cent). Shape ovate. Dorsal and ventral edges very gently curved except at base and apex. Base round. Ventral and dorsal shoulders plump and round. Apex wide, plump, blunt. Pellicle light brown, thin, quite tender; pubescence short; veins fine and distinct; pellicle fold very small on apex half of ventral edge; base scar small, dark brown, usually round. Flavor pleasantly sweet, but rather dry.

Distinguishing characteristics.—The shape of this nut places it in a group with the Batham, I. X. L., Smith, and Trembath. Its distinguishing points are similar to the Batham. (See distinguishing features under Batham for points of difference between it and Henle.)

The Henle is easily separated from the I. X. L. and Smith by the dorsal shoulder of the kernel, which is always round in the Henle and never square and humped, as in the I. X. L. and Smith.

In the Henle the nut is smaller and much lighter in color than in the Trembath. The kernel is also smaller and more tapering at the apex.

COMMENTS

The variety is an erratic bearer and has too many doubles and too crumbly a shell to be of value. It is not recommended for commercial plantings.

36. HUDSON

Origin.—Originated in the Lodi district of California and is still grown to some extent in that section.

Description

TREE

Moderately upright (ratio of height of head to width, 1:1), tall, round topped, moderately strong grower. Trunk with tendency to have wide or longitudinal depressions, somewhat twisted but less than in I. X. L.; bark rough.

Main branches.—Quite vigorous growth; upright, with wide depressed or flat areas. Branching angle quite acute, except on lower branches. Wood slightly brittle. Bark reddish brown, usually smooth; tendency to exfoliate on under side of branches; striations common on young branches.

Twigs.—Straight, rather long, stocky, rigid. Branching angle acute. Wood brittle. Nodes small. Internodes short ($\frac{1}{2}$ to 1 inch). Bark quite tough, frequently with gray bloom; tinged with red in the fall.

Lenticels.—Numerous; unevenly distributed; large (on 8 to 10 year-old wood, $\frac{3}{32}$ by $\frac{3}{8}$ to $\frac{1}{8}$ by $\frac{5}{8}$ inch); raised, rough, gray, wide, short, elliptical, ends acute, sides gently curved. (See Pl. XVII, *C*.)

Foliage.—Not very dense, tree rather open. Leaves quite numerous on individual branches; remarkably flat.

Blade: Rather large ($\frac{5}{8}$ by 3 to $1\frac{1}{2}$ by 4 inches); wide in proportion to length. Ovate or ovate-elliptical with widest part near middle. Base obtuse; origin of margins symmetrical or unsymmetrical. Apex bluntly acute or obtuse. Margins frequently bulging near middle; tendency to be straight near apex; irregularly crenate; bristles in depressions very short and dark. Both upper and lower surfaces light green, smooth, glossy, little difference in the color of the two, especially late in the season.

Petiole: Medium in length ($\frac{3}{4}$ to 1 inch; ratio of length of petiole to length of blade, about 1:4); stocky, rigid. Glands two to four, round, oval, or flat topped, on petiole.

Bearing habit.—Only occasionally on laterals; generally on spurs, mostly on 2-year-old branches. Spurs numerous and many compound; base part of compound spurs very thick ($\frac{1}{4}$ to $\frac{5}{16}$ inch) and short ($\frac{1}{8}$ inch) to point where spurs branch out; single spurs stocky ($\frac{1}{8}$ to $\frac{3}{16}$ inch); long ($\frac{1}{4}$ to $\frac{3}{8}$ inch); expand gradually to form large wide oval (almost round) disk ($\frac{1}{4}$ by $\frac{1}{4}$+ inch). Buds rather appressed; scales reddish. Ripens early, just before Nonpareil.

NUT

Hulled nut.—(Pl. VII, *C*.) Size medium to quite large (averages $1\frac{1}{2}$ by $\frac{7}{8}$ by $\frac{5}{8}$ inches). Number to the pound, 125 to 140. Percentage of kernel to nut, hand cracked, 53.

Shape: Somewhat plump, ovate-oval (edgewise view ovate; usually with plump apex, and frequently with bulging, unsymmetrical sides). Ventral edge very plump, much curved throughout entire length, often slightly depressed at base. On one side of wing is a wide depression running entire length of ventral edge; on the other side the edge is more plump and comes up higher on wing. Wing usually of medium thickness and medium in prominence except at base, where it usually gets less prominent until stem scar is reached; at apex, wing less prominent than in middle; most prominent in middle. Dorsal edge very plump, rather straight, curving mostly at apex; ventral ridge narrow, only slightly elevated, most prominent at base; dorsal suture frequently shows. Base has tendency to be slightly constricted; usually slightly pointed, sharply sloping; dorsal shoulder drops off suddenly near edge of stem scar (less than one-fourth of nut is to dorsal side of axis). Ventral shoulder sloping; frequently depressed. Stem scar small, oval, depressed; sometimes at right angles to axis or more often sloping ventrally. Apex plump, bluntly obtuse, wing distinct, but not prominent at apex; ventral edge much curved; dorsal edge sharply curved at extreme tip; very slight blunt point at tip.

Shell: Usually light brown, soft; easily cracked with fingers. Outer shell medium thick, brittle. Pits moderately numerous, of varying sizes, round to irregular, not very deep; also usually found in dorsal ridge, especially near apex, where they are smaller than elsewhere. Ventral edge grooved lightly; grooved at base, long and at acute angles to wing, especially in depressed portion. Canals small to medium, oval, quite numerous, traversing the shell for the most part longitudinally. Fibers small to medium. Some spongy material between outer and inner shell. Inner shell fairly thin, brittle, dark brown, marked with light-colored streaks or spots, wavy. Ventral streak frequently yellowish brown, sometimes dark brown, long; medium width to wide; widening gradually from apex to base, base bluntly round.

Kernel: Rather large (1¼ by ¾ by ½ inches). Some doubles (12 per cent); fairly plump, ovate. Viewed edgewise, long ovate with straight sides, sharply curving at apex. Dorsal edge slightly longer than ventral and thinner. Ventral edge much curved and plump at base; dorsal edge quite straight. Frequently side has depression due to tendency to form doubles. Base slopes ventrally. Dorsal shoulder square or round humped and thinner near ventral shoulder. Ventral shoulder roundly sloping. Apex bluntly pointed and thin. Pellicle usually rich brown in color, rather thin, smooth at base, slightly pubescent at apex; veining very distinct; base scar small, dark brown, round or wide oval, and frequently pubescent; pellicle fold prominent on apex half of ventral edge. Flavor pleasant, good, nutty, and sweet.

Distinguishing characteristics.—Soft shell, crumbly on outer surface, ventral edge much curved, often depressed at base, dorsal edge nearly straight, base scar ventrally sloping or at right angles to axis, apex plump with ventral edge approaching axis almost at right angles, ridges parallel with wing common on ventral side; often light-colored streaks on inner surface of shell. Kernels frequently double and with longitudinal depression on side.

The nut resembles in shape the Fair, Ne Plus Ultra, and Bigelow. It can be distinguished from these three varieties by the ridges and longitudinal depressions on the ventral edge parallel to the wing.

COMMENTS

This soft-shelled variety has an excellent flavor. It does not usually bear well, however, and is not recommended for further planting.

37. IVICA

Origin.—Ivica nuts are imported in large quantities from Spain. The variety is not grown in California with the exception of a few trees which bear nuts closely resembling the imported Ivica. These trees are probably Ivica seedlings.

Description

Hulled nut.—(Pl. VII, *E.*) Size somewhat variable, average large (1¾ by 1 by ⅝ inches).

Shape: Large, moderately long, flat, rather wide ovate. Ventral edge much curved, especially at apex; part at base depressed or sloping; longitudinal groove and ridge common; wing thick, but not prominent. Dorsal edge rather straight; dorsal ridge narrow and prominent. Base slightly constricted a little like Jordan; ventral shoulder sloping and slightly depressed; dorsal shoulder square, but drops off soon after leaving stem scar; stem scar large, oval, depressed, at right angles to axis or sloping slightly either dorsally or ventrally. Apex pointed, usually somewhat thin; wing visible, but lacks prominence; ventral edge sharply curved; dorsal edge curved or straight at apex. Extreme apex slightly scimitar shaped.

Shell: Hard (somewhat variable). Outer and inner shell thick and hard Dark brown. Pits medium to numerous, medium to small in size, as a rule not deep. Short grooves at base and along ventral edge. Canals large, round, quite numerous for their size, running mostly longitudinally. Fibers large. Network very coarse. Inner shell, wavy, with longitudinal ridges, dark brown. Ventral streak dark brown, narrow, tapering gradually at base to round point.

Kernel: Large (1¼ by ¾ by ¼ inches). Flat, wide, ovate or ovate-elliptical, sort of half way between I. X. L. and Ne Plus Ultra in shape, but more like the latter. Dorsal edge longer than ventral, thin, frequently recurved at apex. Ventral edge more curved than dorsal. Base sloping ventrally, with stem scar well down on slope. Dorsal shoulder humped and round or square, ventral very sloping. Pellicle dark brown to light brown; pubescence abundant, coarse, pellicle fold on lower one-third of apex; veins distinct at base; base scar small, oval, dark brown, medium pubescent. Kernel with fair flavor, slightly nutty, sweet. (Sometimes kernel with long depression on one side, but seldom double.)

COMMENTS

The Ivica nut belongs to a class of inferior almonds. It is of no value for production in the United States.

38. I. X. L.

Origin.—A. T. Hatch, a rancher of Suisun, Calif., who began to cultivate almonds as early as 1872, in 1879 planted a quantity of bitter-almond seeds. He budded most of the resulting trees, but kept about 200 of the seedlings unbudded. As they came into bearing he gradually eliminated as undesirable all the seedlings except four, from which he established four varieties, naming them the I. X. L., Ne Plus Ultra, Extra (later called Nonpareil), and La Prima. The varieties were first grown on the Hatch home place near Suisun. Later (in 1884) Mr. Hatch established a large orchard of the varieties in the Sacramento Valley, on what is now the G. F. Hansen ranch, near Biggs. The original trees on this ranch are still bearing. The I. X. L., Ne Plus Ultra, and Nonpareil were widely advertised and became the leading commercial varieties in California. The I. X. L. gained special popularity, largely because of its attractive appearance in the shell. The leading State and local newspapers described the nut and recorded new plantings. From 1888 until the present time it has been given a prominent place among the nuts in California nursery catalogues. In 1900, firms in other States and even in Australia began to list and describe the variety. As a result, plantings of the I. X. L. were made in Oregon, Washington, Texas, Utah, Nevada, Georgia, and Missouri. These plantings, however, resulted in failure, owing to frosts in spring. It became evident that a variety blooming as early as the I. X. L. could not succeed except under the most favorable climatic conditions. At the present time only a few of the trees can be found outside of California. In that State the I. X. L. is grown in every almond-producing section.

Description

TREE

Tall, upright (ratio of width to height of head, 1:1¼). Rather vigorous grower. Trunk moderately stocky, long, very twisted (more so than in any other variety; fig. 16); bark average in roughness, cracks close together, exfoliates in thin patches.

Main branches.—Straight in growth. Many long depressions in branches. Branching angle acute. Wood quite soft, but somewhat brittle. Bark light reddish brown, inclined to be somewhat rough on old branches, smooth on young branches, frequently patches of silver-gray epidermis present, exfoliates in large flakes.

Twigs.—Rather long, slender, rigid. Branching angle moderately acute. Nodes small to medium. Internodes short (½ to 1¼ inches). Wood somewhat brittle. Bark rather thin, medium in toughness, dull green, slightly tinged with red patches in the fall.

Lenticels.—Very large and long on old bark, but variable in size (on bark 8 to 10 years old, $\frac{3}{32}$ by ⅜ to $\frac{5}{32}$ by ⅝ inch), raised, gray, rough. Old lenticels very wide, with rather straight parallel sides and long acuminate apexes. On young bark lenticels wide-elliptical, apexes acute.

Foliage.—Medium dense, deep green in color. Leaves moderately numerous, tend to remain flat or slightly recurved; rather large but variable, many small leaves on old wood.

Blade: Quite large (⅝ by 2½ to 1⅜ by 4⅛ inches; average, 1 by 3¼ inches). Width variable (ratio of width to length, 1 : 3 to 2 : 7). Mature leaves distinctly ovate. Base obtuse and usually rounding; origin of sides symmetrical or slightly unsymmetrical. Apex half or two-thirds of leaf tapering, i. e., distinctly cuneiform. Margin rather deeply and coarsely crenate; bristle small and short. Midrib medium in size, prominent, pale green, slightly tinged with red in late autumn. Veins distinct. Upper surface dull, medium dark, deep green. Lower surface dull, dark green, lighter than upper, but darker than in many other varieties.

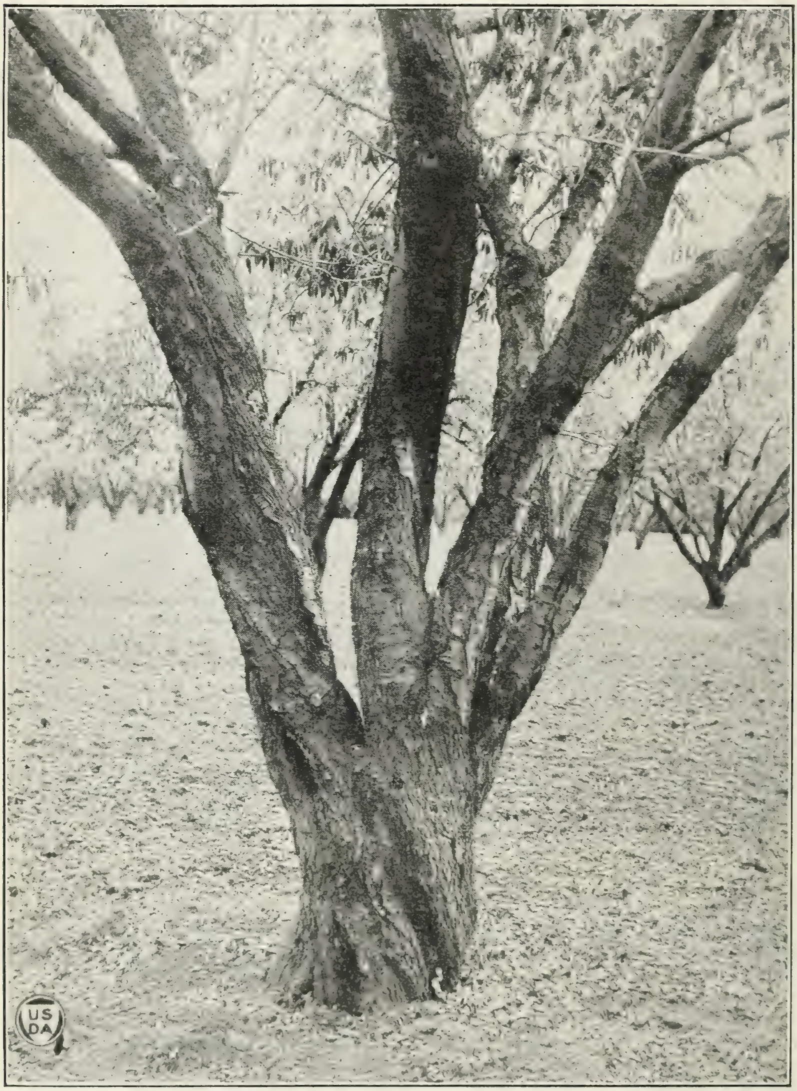

FIG. 16.—An I. X. L. almond tree, showing the characteristic twist of the trunk and of the large branches

Petiole: Medium to long ($\frac{3}{4}$ to $1\frac{1}{4}$ inches; average, $\frac{7}{8}$ inch; ratio of length of petiole to length of blade, about 2:7). Varies in diameter, usually stocky. Under surface pale green; upper, light green, tinged with red in autumn. Groove wide, medium in depth, shallow and narrow at base. Glands one to four, generally two; large, globular or oval with upper surface sometimes depressed; yellow or yellowish brown; on petiole (usually two are very close to blade); sometimes one basal crenation glandular.

Bearing habit.—On spurs on wood 1 to 5 years old; many spurs on 1-year-old wood. Some nuts borne on laterals. Sometimes spurs live and bear two years. Diameter of spurs, medium to large ($\frac{1}{8}$ to $\frac{1}{4}$ inch), long ($\frac{1}{4}$ to $\frac{1}{2}$ inch); spurs on old wood tend to be short and thick. Disk large, wide oval ($\frac{3}{16}$ by $\frac{1}{4}$ inch). Buds free, large, plump, rather short; scales medium in size, dark brown, thin, tough, with very short, gray pubescence on edges. Ripens August 12 to September 5, depending on locality and season.

NUT

Immature nut.—Size medium ($1\frac{3}{4}$ by $1\frac{1}{4}$ by $\frac{7}{8}$ inches). Wide ovate. (Edgewise view, oval with tapering apex.) Ventral edge only slightly ridged (ridge $\frac{1}{4}$ inch wide and $\frac{1}{32}$ inch deep or less); suture depression entire length of ventral edge, narrow, medium in depth ($\frac{1}{64}$ inch). Dorsal edge curving, but less than ventral, curves sharply at apex, slightly ridged. Base nearly at right angles to axis, dorsal shoulder rather square, cavity shallow ($\frac{1}{64}$ inch), and $\frac{3}{8}$ inch in diameter. Apex pointed, with ventral edge rounding and sloping and dorsal edge rounding; suture line depressed at apex; style drops early; rudiment small and pubescent.

Hull: Outer surface green, becoming yellowish green and finally brown during ripening period; pubescence abundant, fine, short, gray, silky. Inner surface light green, gradually turning brown as dehiscence proceeds. Dehiscence begins along ventral edge, usually throughout its entire length, but sometimes begins at apex or base; dorsal edge then dehisces from apex upward until hull is completely divided (fig. 12); the two halves remain attached at base, spread and curl at apex; ventral and dorsal edges curl inward and assume a twisted appearance; halves curl about equally; sometimes cracks occur at apex; frequently dorsal edge cracks only partially.

Hulled nut.—(Pl. VII, *D.*) Size medium to large ($1\frac{1}{8}$ by $\frac{7}{8}$ by $\frac{5}{8}$ to $1\frac{1}{2}$ by $1\frac{1}{8}$ by $\frac{3}{4}$ inches). Number of nuts to the pound, 140 to 200. Percentage of kernel to shell in hand-cracked samples, 51; in orchard run, machine-cracked sample, 47.

Shape: Rather flat. Ovate, wide in proportion to length; (viewed edgewise, ovate, with sides gently curving, either symmetrical or unsymmetrical). Ventral edge much curved; wing thin, very prominent, with a smooth regularly curved edge, distinct up to the stem scar, most prominent throughout apex half; ends in point at apex. Dorsal edge gently curved, most curving on apex half, generally curving inward sharply at apex. Dorsal ridge usually prominent, especially at base. Dorsal suture line frequently visible. Base slightly truncate, at right angles to axis, or slightly ventrally sloping; stem scar generally narrow. Apex bluntly pointed, with mucronate tip; thickness varies; viewed edgewise, sides generally curve outward very slightly.

Shell: Outer surface light to dark brown. Pits numerous, round, varying in size on the same nut. Parts between pits spongy in texture and stippled in appearance. Outer shell soft and crumbling, easily breaking away from the thin harder portion of inner shell. Fibers very large. Inner surface of shell light brown in color, frequently lighter in color than outer surface; shallow depressions give inner surface slightly ridged appearance. Ventral streak dark brown, wide, medium to long, with base end usually pointed.

Kernel: Doubles only occasional. Size medium to large (1 by $\frac{5}{8}$ by $\frac{1}{4}$ to $1\frac{1}{4}$ by $\frac{3}{4}$ by $\frac{5}{16}$ inches). Shape broadly ovate, wide in proportion to length; flat, thin, especially when grown during dry season; wrinkles much on drying; seldom fills shell. Dorsal edge much thinner than ventral. Base sometimes rounding when viewed flatwise, but more often dorsal shoulder is square, humped, and thin. Apex broad, round, thin, with small acute tip. Pellicle dark brown, medium tough, thickly covered with pubescence; pellicle fold on apex half of ventral edge small; veining indistinct. Flavor slightly sweet. Fair only.

Distinguishing characteristics.—Nut rather flat, quite wide and short; ventral edge sharply curving; wing prominent; base ventrally sloping or right angles to axis; apex blunt with small point; kernel short, wide, with square or humped dorsal shoulder; and abundant, short pubescence. The I. X. L. nut is distinguished from the nuts it resembles by the base, which is commonly sloping ventrally or at right angles to the axis. It resembles in shape the Batham, Henle, Smith, and Trembath. For points of difference between it and Batham and Henle, see distinguishing features under those varieties.

The I. X. L. is easily distinguished from the Smith by the shorter and wider kernel, which lacks the deep longitudinal crease so common in the side of the Smith kernel.

The I. X. L. kernels are shorter and very much less pubescent than the Trembath kernels, and the dorsal shoulder of the I. X. L. kernel is square or humped while in the Trembath the dorsal shoulder is round.

COMMENTS

There was a period in which it was difficult to market the entire crop of I. X. L. almonds, but at present it is one of the best sellers to the market for unshelled nuts, and there is little danger of overproduction. The nut is large, regular, and, in general, attractive in appearance. From the growers' standpoint the variety has proved on the whole unsatisfactory. It is subject to injury by spring frosts because of its early blooming (February 10 to March 15, depending on locality and season), is a very light bearer in most localities, produces many gummy nuts, and in some seasons most of the nuts are sticktights. It does well in the Banning district in southern California and in the foothill sections west of the Sacramento River. In most other districts the variety has not paid the growers for the cost of production. For this reason many growers have grafted their I. X. L. trees over to other varieties, or to other fruits, or have converted the trees into firewood. Further plantings of the variety are not to be recommended except in the most favorable localities. It is a good pollinizer for the Ne Plus Ultra, but the I. X. L. and Nonpareil will not pollinize each other. The I. X. L. tree is less susceptible to disease than some other varieties.

OTHER TYPES

Many nuts closely resembling the I. X. L. are grown in California. None of the types are superior or equal to the I. X. L.

39. JORDAN (MALAGUENA JORDAN)

Origin.—This type of Jordan almond is exported in large quantities from Spain. Great quantities of the kernels are imported into the United States, where they find a good market. Walter T. Swingle, Office of Foreign Seed and Plant Introduction, United States Department of Agriculture, secured scions of the Malaguena Jordan from Pedro Giraud in Spain, and propagation of the variety from these scions was begun at the United States Plant Introduction Garden at Chico, Calif., in 1912. Since that time trees of the Malaguena Jordan have been distributed to practically every almond-growing district in the country, but no large plantings have been made.

Description

TREE

Very upright (ratio of width of head to height, 1:1⅓). Not very dense. Trunk medium stocky; bark rough.

Main branches.—Slightly crooked, long, upright, quite stocky. Branching angle acute. Wood medium tough, with many knots. Bark light reddish brown, rough on old branches; exfoliates in moderately thick flakes; striations common.

Twigs.—Quite numerous and slender, giving the tree a willowy or feathery appearance. Branching angle sharply acute. Bark rather thin and tough, light green, commonly with brownish patches.

Lenticels.—Very numerous, large (on bark 8 to 10 years old, $\frac{3}{32}$ by $\frac{3}{8}$ to $\frac{3}{32}$ by $\frac{3}{4}$ inch; on bark 5 to 6 years old, $\frac{1}{32}$ by $\frac{3}{16}$ inch), long, narrow, with longitudinal cracks; raised, gray; shape usually long-elliptical, but variable; sides near middle tend to be straight in old lenticels; ends sharply acute or shortly acuminate. (See Pl. XVI.)

Foliage.—Of medium density. Leaves flat or slightly recurved, medium in number, rather small, some in clusters.

Blade: Size varies much (½ by 2 to ¾ by 3¾ inches; average medium, ½ by 3¼ inches; ratio of width to length, about 1:6). Shape narrow-elliptical, usually widest near middle. Base acute; origin of margins usually unsymmetrical. Apex sharply acute. Margin finely crenate; crenations shallow. Midrib and veins fine, distinct, very slightly elevated on lower surface.

Petiole: Varies in length (average ⅞ inch) and stockiness, usually slender; ratio of length of petiole to length of blade, about 2:7. Green. Groove usually wide and quite deep, slightly tinged with red in autumn. Glands two to four, small, yellowish, round, oval, or bractlike.

Bearing habit.—Produces light crops on the average, but bears better than the Rock type Jordan. Nuts mostly single on spurs on 3-year-old wood, but some on wood 2 to 4 years old and on last year's laterals. Aborted, deformed, and dried up kernels are common. Spurs long but variable (¼ to ⅜ inch) and medium to quite stocky (⅐ to 5/32 inch); expands gradually to small, wide oval, or nearly round disk (3/16 by 3/16+inch in diameter). Buds smaller than in the Rock type Jordan, short and bluntly pointed; scales medium size, reddish brown, rather thick, with considerable pubescence, but not nearly so much as in the Rock type Jordan.

NUT

Immature nut.—Size average large (2 by 1¼ by 1 inches). Shape rather plump; oval or slightly ovate-oval, part on ventral side of axis oval, part on dorsal side oblong-ovate. Ventral edge curves sharply, especially at apex; ventral suture depression distinct (1/32 inch wide, 1/64 inch deep), no ventral ridge. Dorsal edge plump, rather straight in middle, curving sharply at base and apex. Base plump, rather rough; slightly sloping dorsally or at right angles to axis, depressed slightly on ventral edge; dorsal shoulder square but not prominent, rounds off suddenly 3/16 inch from center of disk; stem cavity ¼ inch across or slightly more. Apex round or very broadly tapering; ventral edge sharply rounding; dorsal edge curving rather abruptly at immediate apex; style drops quite late; rudiment rather large, very pubescent.

Hull: Outer surface green, turning greenish yellow upon dehiscing; pubescence very long, abundant, coarse, gray, woolly. Color of inner surface turns rapidly from green to brown during dehiscence. Dehiscence starts along ventral edge, usually beginning at base, one half drying faster than the other and curling inward; frequently a horizontal or oblique crack appears above the apex and goes halfway or more through the hull. Ripens September 15 to October 15, depending upon season and locality.

Hulled nut.—(Pl. VIII, *B.*) Size large (1¾ by ⅝ inches). Number to the pound, 80 to 100. Percentage of kernel to nut in hand-cracked samples, 30.

Shape: Long, but entirely different from the Rock type Jordan; long-ovate; plump at base as a rule (viewed edgewise, long-ovate with cuneiform apex). Ventral edge much curved, but gradually curved, never having angle in middle, straightest near middle, but gradually curving clear to the pointed apex. Wing medium thick and medium in prominence. Long, wide, shallow indentation along ventral edge on one side of wing. Dorsal edge quite straight, plump; dorsal ridge narrow, but seldom prominent. Base plump; ventral shoulder rounding; dorsal shoulder square; stem scar medium to large, oval, slightly depressed, generally at right angles to axis, sometimes slightly sloping dorsally. Apex pointed; ventral edge much curved, approaching tip at nearly a right angle to axis; dorsal edge curves in slightly. Point of nut broad scimitar shape. Viewed edgewise, apex is rather thin and somewhat cuneiform.

Shell: Hard, thick, but not so thick as in the Rock Jordan. Usually light brown in color. Pits medium in number, irregular in shape. Very shallow depressions between pits of same size as pits. Small and shallow short grooves on ventral edge at base. No difference in hardness between outer and inner shell. Canals medium to small, round, halfway between outer and inner surface. Fibers medium to small. Inner surface of shell light brown; usually smooth and regular. Ventral streak usually light brown, but darker in color than the rest of the surface, medium to long, medium in width, base slightly pointed.

Kernel: Doubles occasional (3 to 5 per cent). Quite large (average, 1¼ by ⅝ by 5/16 inches), rather flat, fills shell cavity. Attractive in appearance. Shape varies, generally ovate or elliptical in flat view, usually ovate in edgewise view. Ventral edge curved less than in the Rock type Jordan. Dorsal edge straight and longer than ventral. Base truncate or round; dorsal shoulder square; ventral shoulder sloping, but less than in the Rock type Jordan. Apex wide, blunt, with a small and usually recurved point. Pellicle medium thick, medium tender, light to dark brown; pubescence coarse and abundant; veins distinct; base scar small to medium, dark brown; pellicle fold small and on apex third of ventral edge. Flavor good, nutty, with very slight bitter flavor.

Distinguishing characteristics.—Shell hard. Shape long ovate; apex broad scimitar shaped; ventral streak long and slightly pointed at base; pits medium number, shallow and small; wing more prominent than in the Rock type Jordan; kernel long, pubescent, with sloping ventral shoulder; and more plump than in Rock Jordan. It is easy to distinguish this nut from other Jordans.

COMMENTS

The Malaguena Jordan is found to give light crops, when the average is taken over a series of years; the percentage of kernel to nut is small. The kernels are attractive in appearance, but in some seasons a considerable number are deformed. The nuts ripen rather late and are sometimes injured by early fall rains. Although the total quantity of the nuts produced amounts to several tons annually and the variety is found in every almond-growing district in California, the trees are scattering and were planted by various orchardists merely for the purpose of testing the variety. The Malaguena Jordan is not suitable for commercial planting.

40. JORDAN (ROCK JORDAN)

Origin.—This variety is called the Rock Jordan to distinguish it from several other Jordans. It was introduced from Spain by John Rock, of Niles, Calif., in 1897, and later, in 1901, by David Fairchild, of the Office of Foreign Seed and Plant Introduction, United States Department of Agriculture. The variety was planted in every district in California and soon was sold by nurserymen in several other States. In late years most of the Jordan orchards have been worked over to other varieties or removed, but trees are still found in all almond districts.

Description

TREE

Upright (ratio of width of head to height, 1:1⅛). Only moderately vigorous, varying much in this regard. Trunk stocky on good soil; bark moderately rough, exfoliates in large flakes.

Main branches.—Long, slender, numerous, upright. Branching angle acute. Large branches have tendency to have long flat depressions. Small branches slender and numerous, giving the outer portion of tree a thick, willowy appearance. Wood tough. Bark quite smooth except for exfoliations and striations, which are common; under bark dark, cherry brown, overlaid with patches of dark gray epidermis, sometimes to such an extent as to give the entire area of the branches a dark-gray appearance.

Twigs.—Medium in length, moderately vigorous, slender, willowy, flexible. Branching angle sharply acute. Nodes medium in size. Wood tough. Internodes rather short (½ to 1 inch). Bark green, tinged with red in autumn.

Lenticels.—Numerous; vary much in size, generally large (on bark 8 to 10 years old, 3/32 by ¼ to ⅛ by ⅞ inch); wide, short, raised, rough, gray; wide elliptical, with wide, acute, and frequently tapering ends.

Foliage.—Dense. Leaves medium in number on individual branches.

Blade: Size small (5/16 by 2 to 1⅛ by 4 inches); average, ¾ by 2¾ inches; ratio of width to length, about 1:4). Shape usually long, narrow, elliptical; widest part near middle; occasionally ovate or obovate. Base bluntly acute; origin of margins symmetrical or nearly so. Apex acute. Margins frequently irregular, curve from middle to either end usually about the same, but sometimes blade tapers from middle to apex more than from middle to base; finely crenate, doubly crenate, or occasionally serrate; bristles small, short, dark. Midrib usually large and prominent. Veins distinct. Upper surface light deep green. Lower surface a little lighter than upper. (See Pl. XX, *A*.)

Petiole: Rather long (average, ⅞ inch; ratio of length of petiole to length of blade, about 2:7); heavy, stocky, and quite rigid; under surface pale green; upper surface tinged with dull rusty red in autumn. Groove varies in width.

averages rather narrow and shallow. Glands two to six, commonly two, small, globular, brownish.

Bearing habit.—Mostly on wood 2 to 4 years old; some on laterals; many borne in pairs; very few compound spurs. Spurs rather slender (⅛ inch), long (⅜ to ½ inch); generally with a marked constriction; expands gradually to rather small round disk 3/16 inch in diameter. Buds free, very large, plump, long, constricted at base; scales rather small, brownish gray, rather thick and tough with much long pubescence.

NUT

Immature nut.—Rather large (2 by 1⅛ by 1 inches). Shape long triangular, part on ventral edge of axis forms two sides of a triangle, part on dorsal side of axis long, oblong, oval. Ventral edge much curved and bulging in middle, one side often elevated more than the other; ridge seldom present; ventral suture depression usually crooked; wide (¼ inch), deep (1/16 to 1/32 inch). Dorsal edge varied and irregular in curve, but gently curved, curving sharply at apex. Base pointed, usually at right angles to axis. Apex pointed; style falls rather early.

Hull: Outer surface of hull green; pubescence abundant, quite coarse; standing out rather straight, medium length, gray. Inner surface green when partially dehisced, turning to brown. Usually dehisces on ventral edge only, but cracks occur on sides and on dorsal edge; ventral edges roll inward but curve out at tip. Many sticktights in dry soil. Ripens August 15 to September 30.

Hulled nut.—(Pl. VIII, *A.*) Size varies on same tree, especially when crop is heavy; medium to large (average, 1⅞ by 1⅝ inches). Number of nuts to the pound, 75 to 90. Percentage of kernel to nut in hand-cracked samples, 24; in machine-cracked orchard run, 21.

Shape: Nuts frequently distorted, rather thin, long and narrow; very distinctive, half-diamond shaped, the ventral edge forming the two sides of the diamond. Viewed edgewise, the nut is long oval, sides frequently unsymmetrical. Ventral edge plump, much curved and bulging; widest portion of nut in middle; ventral edge from middle to base and apex generally almost straight, giving the nut a narrow triangular appearance. Longitudinal depressions and ridges common. Wing never prominent, but varies in prominence and width. Dorsal edge varies in plumpness; almost straight; dorsal ridge narrow, varies in prominence, usually not prominent. Base narrow, thin, practically always constricted; stem scar very large, round, depressed, at right angles to axis, or slightly sloping ventrally. Apex blunt or widely acute. Viewed edgewise it is cuneiform, with sides slightly curving. Extreme tip with a little point, usually slightly recurving.

Shell: Light to dark brown. Very hard, thick; no difference in texture of outer and inner shell. Pits very numerous, small, round, shallow. Shallow depressions between the pits of same size as pits. Wide depression on one or both sides of wing extending almost the entire length of ventral edge. Ventral edge pitted and grooved near wing and at base; grooves narrow. Dorsal edge pitted and sometimes has very short grooves. Canals about half way between inner and outer surface, medium to small, round, rather numerous. Fibers small to medium. Inner surface of shell medium to dark brown. Ventral streak dark brown, short, medium in width, wide and blunt at base, usually tapering slightly from near middle to base of streak.

Kernel: Varies in size; average large (1¼ by ⅝ by ⅜ inches). Very few doubles (2 to 5 per cent). Kernel completely fills shell cavity. Shape variable; very long, rather flat, oval or ovate, widest and thickest near middle. Ventral edge much curved, thin, but more plump than dorsal, frequently with sides sloping from middle to apex. Dorsal edge rather straight and thin. Dorsal shoulder rounding and above base scar. Ventral shoulder sloping with very long slope. Apex thin, blunt, with small sharp tip. Pellicle thin, medium tender, light to dark brown in color; pubescence abundant, short; veins very distinct; base scar dark brown, variable in size and shape, but distinct; medium heavy pellicle fold. Flavor sweet, attractive, excellent.

Distinguishing characteristics.—Nuts very long and narrow; ventral edge bulging in middle; dorsal edge generally recurved at some portion; base and apex tapering, base much constricted and usually depressed on ventral edge; pits numerous but shallow; shell very thick and hard; kernel very long. One of the easiest varieties to identify.

COMMENTS

At one time the Rock Jordan was very widely planted in California, but commercial orchards of the variety have now practically disappeared. The tree bears irregularly and sparingly. The nuts are very hard shelled, only a small percentage being kernel. It is impossible to crack the nuts with machinery at present without breaking the kernels, because the kernel completely fills the entire shell cavity. The variety can not be produced profitably on a commercial scale in this country, owing to its light-bearing habit and the very large amount of shell in proportion to the kernel. The kernel is very popular with the confectionery trade, and large quantities are imported from foreign countries (chiefly from Spain) where cheap labor makes it possible to hand crack them.

OTHER JORDAN TYPES

Besides the Malaguena and Rock types of Jordan almonds, other types of hard-shelled Jordans are imported. Two common types possessing large, attractive kernels of good flavor are illustrated in Plate VIII, *C* and *D*.

41. KING (KING'S SOFT SHELL)

Origin.—At San Jose, Calif. Date of origin in question. Nuts of the variety appeared in the market as early as 1893. Nursery companies in California advertised trees of the variety for sale in 1892. The King variety attracted considerable attention for a time, owing to the large proportion of kernel to shell. Young trees bear rather regularly, but the older trees seldom produce a heavy or even a medium-sized crop. It has gradually passed out of favor with growers, but is still grown to limited extent in all the older almond districts of the State. The variety is often confused with California and Princess, in some sections with Klondike and Silvershell, and even with Nonpareil.

Description

TREE

Large, upright, with somewhat spreading top, round topped, very vigorous grower. Trunk exceedingly stocky, straight. Bark on old trees has deep cracks, close together, exfoliates in small flakes.

Main branches.—Long, slender, vigorous, quite upright. Branching angle acute. Wood rather soft. Bark tends to be rough and cracked, especially on old wood; under bark reddish brown, covered with patches of gray epidermis on younger branches. On old branches outer layers of bark frequently gray.

Twigs.—Slender, somewhat willowy. Nodes rather small. Internodes quite short, varying in length from ¼ to 1 inch. Branching angle moderately acute. Bark rather thin and tough, green.

Lenticels.—Size variable (on bark 8 to 10 years old, 1/16 by 3/16 to ⅛ by ⅜ inch); vary in number from few to many, usually about medium in number, numerous on young growth; raised; gray; wide oval, with blunt apexes. On twigs lenticels are numerous, round, grayish green.

Foliage.—Medium dense. Leaves medium in number, small, tend to curve and twist slightly.

Blade: Small, wide, short; distinctive of the variety. Size varies (average, 1 by 2½ inches; ratio of width to length, 2.5). Shape variable, ovate, obovate, or elliptical. Base usually obtuse; origin of margins symmetrical or slightly unsymmetrical. Apex acute to bluntly round. Margins crenate or doubly crenate, crenations very short and usually deep, bristles small and dark. Midrib rather heavy, moderately prominent. Veins distinct. Upper surface of blade medium deep green. Lower surface dull green, a little lighter than the upper but darker than in many other varieties.

Petiole: Very stocky, short (average ⅝ inch), medium for size of blade, rigid (ratio of length of petiole to length of blade, about 1:4). Lower surface pale green; upper green. Groove wide, deep. Glands two to four, commonly two, small, globular, greenish yellow.

Bearing habit.—On spurs 1 to 4 years old. Many spurs on last year's laterals. A considerable number of spurs are borne on laterals springing from wood 4 to 7 years old. Spurs short (⅛ to 3/16 inch), rather thick (⅛ inch); widens near twig; expands suddenly to broad elliptical disk (3/16 by ¼ inch).

Buds free, large, plump in middle, slightly constricted at base, apex long and blunt; scales reddish brown, large, very thin, rather brittle, with very small amount of pubescence on edges.

NUT

Immature nut.—Size rather small (1¼ by 1⅛ by ⅞ inches). Shape irregular broad ovate, slightly cordate on ventral side of axis, oval on dorsal side. (Edgewise view ovate.) Ventral edge curves sharply, most curved near base; exceedingly smooth; suture depression distinct, narrow, medium in depth the entire length of ventral edge. Dorsal edge curved, but less than ventral. Base plump, broad, somewhat truncate, sloping dorsally; stem cavity broad (⅜ inch), medium in depth (1/32 inch). Apex sharply rounding like point of an egg; sometimes slightly depressed, but generally full and round; style drops early; rudiment medium in size, pubescent.

Hull: Outer surface green; pubescence abundant, short, quite coarse, gray, and pointing toward apex. Inner surface grayish green when dehiscence starts, frequently pink at suture; changes to light brown as dehiscence continues. Dehisces along ventral edge first, then cracks appear at either or both ends of dorsal edge; dorsal edge frequently cracks entire length, dividing the hull in halves, but more often it remains attached at its middle or throughout most of its length; other cracks usually occur, especially at base; these may run lengthwise of the hull, transversely or obliquely. The hull spreads out wide as a rule; ventral edges curve inward, and when divided in halves both ventral and dorsal edges curve inward, frequently curving more on one side than on the other. Dehisces August 5 to September 15, depending on season and locality.

Hulled nut.—(Pl. IX, *A.*) Quite small to medium (averages 1⅛ by ⅞ by ⅝ inches). Number to the pound, 245 to 275. Percentage of kernel to nut in hand-cracked samples, 60 to 70.

Shape: Ovate with sharp tapering apex; part to wing side of axis slightly cordate; (viewed edgewise, plump, ovate with bulging sides). Ventral edge gradually and evenly curved, with a tendency to straighten at apex; wing thin and very prominent along entire ventral edge, less pronounced at shoulder than in California. Dorsal edge plump, curved slightly. Curve is usually increased at immediate apex. Base varies in plumpness, wide, sloping sharply dorsally; stem scar narrow, long, variable in size (average small), sharply dorsally sloping. Apex fairly plump, but much more pointed than in California. When loose portion of outer shell is removed, apex is seen to have a rather long, sharp point, curving ventrally.

Shell: Paper; outer shell thin, spongy, flaky; much of it adhering to hull in hulling. Outer surface various shades of brown, usually light brown, frequently with reddish tinge. Pits frequently missing on account of flaky surface. Inner shell thin, inner surface light brown, slightly undulating, ventral streak long, dark brown, very wide, sides gradually increasing in curve from middle to base, base end rounding. Fibers coarse.

Kernel: Some doubles (3 to 5 per cent). Size medium to large (average 1 by ⅝ by ½ inch), plump, ovate with tapering apex. Both dorsal and ventral edges curved; nearly equal in curve at apex. Dorsal edge longer than ventral. Ventral edge plump. Dorsal shoulder square, sloping, and either below or on level with base scar. Ventral shoulder round, plump, sloping abruptly from base scar; base scar as in the California is at highest portion of kernel. Apex pointed and somewhat cuneiform in both side and edge views. Pellicle thin, veins very distinct; pubescence fine and short (much less pubescence than in the California); pellicle fold quite heavy on apex half of ventral edge; base scar large, dark brown, round or oval. Flavor flat; very slightly sweet.

Distinguishing characteristics.—In shape the King nut closely resembles the California, Klondike, and Princess. It also resembles the Silvershell and Nonpareil.

For points of difference between the California and King, see distinguishing characteristics under California.

The close resemblance of the King nut to the Klondike is remarkable. The base of the King is sharply sloping dorsally and that of the Klondike only slightly dorsally sloping; in the King the base of ventral streak is wide, while in the Klondike it is frequently tapering; the kernel of the King is more cuneiform at the apex, and the pellicle is more pubescent. The King is much inferior in flavor to the Klondike.

It is very difficult to distinguish between the King and Princess nuts. The Princess has many imperfect kernels, while the King seldom has imperfect or deformed ones. In the Princess kernels the dorsal edge at the apex is frequently curved more than the ventral, while in the King the edges curve about the same at the apex. The ventral streak in the King is usually a little wider than in the Princess.

The King is easily distinguished from the Silvershell by the fact that the shell of the latter is much harder, with the pits distinct. In the King the pits are usually invisible, the outer portion of the paper shell being flaky.

Occasionally the King and Nonpareil are confused. The base of the nut slopes dorsally in the King and slopes ventrally or is at right angles to the axis in Nonpareil. The base of the Nonpareil is more tapering, and the ventral edge is more curved than in the King. The ventral streak is very wide in the King and quite narrow with base acuminate in Nonpareil. The kernel of the Nonpareil is more oblong and has much less pubescence than in the King.

COMMENTS

In appearance the kernel of the King is plump and attractive; the flavor is inferior to the Klondike or to the Nonpareil. Although it blossoms about the same time as the Nonpareil and Ne Plus Ultra and is interfertile with them, it has not as a rule been interplanted with those varieties for pollination purposes, since its light bearing habit has precluded extensive plantings. The variety will probably soon be entirely eliminated from commercial orchards.

42. KLONDIKE

Origin.—John Butler, of Knightsen, Calif., planted a quantity of almond seeds, one of which produced a tree bearing almonds having kernels of very fine flavor and appearance. From this seedling George W. Knight in 1894 began to propagate trees in his nursery at Knightsen. Some of these were planted on the O'Hara ranch, near Oakley, Calif. Later the variety was distributed quite extensively over the Oakley district. The name "Klondike" as a variety name was suggested to Mr. Knight at an exposition where he was exhibiting some of the nuts. Although not widely advertised, the Klondike almond has been planted to some extent in the Davis, Winters, Durham, Chico, Live Oak, Lodi, Manteca, Oakdale, and other districts. At the present time some growers having this variety in their orchards erroneously suppose it to be the I. X. L. or a "type" of the I. X. L., and it appears that in some instances budwood of the Klondike has been distributed as I. X. L. The nut is occasionally confused with Nonpareil and often with California, King, Princess, and Silvershell. The kernel is frequently mistaken for I. X. L.

Description

TREE

Very upright (ratio of width of head to height, 1 : 1¼) ; moderately vigorous grower with many branches. Trunk medium stocky, tends to be slightly twisted; bark rough, cracks deep and close together, exfoliates in large thick flakes.

Main branches.—Quite long, moderately slender, upright. Branching angle sharply acute; branches frequently slightly twisted, and tend to have long, slightly flattened areas, i. e., branches not always round in cross section. Bark dark brown; rather rough on old branches; exfoliates in large flakes. On young branches gray striations or gray epidermis are common.

Twigs.—Medium in length, tend to grow straight, slender; flexible. Branching angle acute. Wood tough. Nodes quite large. Internodes rather long (½ to 1½ inches). Bark rather tough, green, turning darker in autumn, with brown areas on upper surface of twigs.

Lenticels.—Vary from medium to numerous in number. Large (on bark 8 to 10 years old, $\frac{1}{16}$ by ½ to $\frac{3}{32}$ by ⅝ inches), raised slightly; gray; rather narrow and long, generally with acuminate apexes; frequently brownish; crack longitudinally. On young wood, lenticels wide-elliptical; acute apexes.

Foliage.—About average in density. Many leaves borne in clusters on spurs; variable in size, many small ones; average about medium; tend to recurve much and to twist somewhat, also to roll up along midrib. Leaves tend to drop early, especially in dry seasons, i. e., before Ne Plus Ultra sheds its leaves.

Blade: Size variable, average medium (¾ by 3 inches; ratio of width to length, 1:4). Shape of mature blade usually ovate, but frequently elliptical-ovate; widest part generally near base or one-third of way from base to apex. Base bluntly acute; origin of margins symmetrical or nearly so. Apex generally long, tapering; extreme tip acute or bluntly acute.

Margin deeply and shortly crenate. Midrib varies in size, prominent. Upper and lower surface of blade light green.

Petiole: Varies in thickness. Long (average, 1 inch; ratio of length of petiole to length of blade, 1:3). Lower surface pale green. Upper surface light green. Groove usually wide and shallow, especially near point of attachment to twig. Glands, none to four, commonly two, globular, rather small, yellowish.

Bearing habit.—Produces quite well when young, but appears to decrease in production as trees get older; on spurs and also on short laterals. Spurs vary in length, medium in diameter (⅛ inch); expands suddenly to large oval disk ¼ by $\frac{5}{16}$ inch. Buds free, large, plump, short, bluntly pointed; scales dark brown, medium size, rather thick and tough, with considerable pubescence. Nuts adhere to disk and are harvested with difficulty; frequently all the hulls are knocked off the tree before the nuts are loosened.

NUT

Immature nut.—Size averages medium (1½ by 1¼ by 1 inches). Shape plump, nearly round, or very wide ovate, part on ventral side of axis wide oval; on dorsal side long oval or long obovate. Plump. Ventral edge curving almost in the form of a circle; suture depression narrow ($\frac{1}{16}$ inch) and shallow ($\frac{1}{32}$ inch). Base round, slightly sloping dorsally; cavity none or so slight that disk appears to be on surface of hull; sometimes exceedingly short grooves are present. Apex usually plump and broadly rounding; suture very slightly depressed to ventral side of rudiment; style usually drops early; rudiment very small, pubescent.

Hull: Outer surface, green, holding color well while dehiscing, finally becoming yellowish green and then brownish; pubescence abundant, fine, medium long, gray, felty. Inner surface pale green when dehiscence starts, turning brown as dehiscence continues. Dehisces first along ventral edge; when abundant moisture is present in soil dehiscence usually continues on dorsal edge, either from base end or from apex, or both; entire dorsal edge may crack, causing the hull to divide into halves; hull may dehisce on ventral edge only, especially when moisture is lacking in soil; ventral edges tend to curve outward in middle and inward at base and apex. Many sticktights in dry seasons. Ripens August 10 to September 15, depending on season and district. Nuts tend to ripen unevenly, even on same tree.

Hulled nut.—(Pl. IX, *B.*) Vary much in size, very small to large ($\frac{15}{16}$ by $\frac{11}{16}$ by ½ to 1⅝ by 1⅛ by ¾ inches). Very small when grown in dry soil and large when moisture is present. Number of nuts to the pound, 150 to 250. Percentage of kernel to nut, hand cracked, 65.

Shape: Usually plump; wide ovate, sometimes almost round, occasionally almost triangular; viewed edgewise, ovate. Ventral edge much curved; most sharply curved at ventral shoulder; wing thin and very prominent. Dorsal edge decidedly curved; dorsal ridge narrow and prominent. Base rounding or truncate, usually round; fairly plump; stem scar large, long, depressed, and slightly sloping dorsally. Apex thin, wide, bluntly pointed; wing prominent, curving much, approaching axis at obtuse angle.

Shell: Paper; outer shell spongy, thin, and somewhat flaky; outer surface light to dark brown, frequently with reddish tinge. Pits very large, shallow, medium in number, frequently with raised portion around them. Inner shell very thin. Inner surface medium to light brown, sharply undulating. Ventral streak dark brown, medium in length, medium in width, tendency to be pointed at base but frequently base end is blunt.

Kernel: Occasional doubles (3 to 7 per cent). Very small to very large (¾ by ½ by ⅜ to 1½ by ⅞ by ⅝ inches). Does not quite fill shell. Shape flat, short, wide, ovate; viewed edgewise, long ovate. Dorsal and ventral edges usually curve about the same at apex; dorsal edge a little longer than ventral. Base very wide, broadly round or slightly truncate, sloping very slightly ventrally; dorsal shoulder thin, somewhat square and usually sloping; ventral shoulder plump, sharply rounding and sloping. Apex plump, wide, but slightly tapering, with sides slightly curving. Apex broader and less cuneiform than in King and more flat. Pellicle light to medium brown; thin, tender; pubescence very short, fine; veining distinct, pellicle fold medium heavy along apex third of ventral edge; base scar, medium to large, round or oval, frequently slightly elevated, distinct. Flavor sweet and nutty. Excellent. One of the very best.

Distinguishing characteristics.—The Klondike is sometimes confused with Nonpareil, many times with Silvershell, and often with California, King, and Princess. Its kernel is often taken for that of the I. X. L., but it is far superior to the I. X. L. in flavor and is shorter, as a rule. For the points of difference between Klondike, California, and King, see the distinguishing characteristics of the latter two varieties.

The Klondike and Princess are often confused. The stem scar of the Princess slopes more sharply dorsally than in the Klondike. In the Klondike the ventral streak has a tendency to be pointed at the base, while in the Princess the base of the streak is as wide or wider than any other portion. The Princess has many more imperfect kernels than the Klondike.

In the Silvershell the shell is much harder, lighter in color, the apex of the nut is much more pointed, and the base slopes much more dorsally than in the Klondike. The pits in the Silvershell are also deep and distinct, while in the Klondike they are very shallow and indistinct.

The Klondike is distinguished from the Nonpareil as follows: The base scar in the Klondike slopes dorsally; in the Nonpareil it slopes ventrally or is at right angles to the axis. The kernel of the Klondike is short, wide at the base, rapidly tapering from the base to apex, and commonly with dorsal shoulder humped. In the Nonpareil the kernel is very smooth, is long, only slightly tapering, and the base is round.

COMMENTS

One of the chief defects of this variety is the tendency of the nuts to adhere to the trees so tenaciously as to make harvesting unduly expensive. Another defect is the tendency of the old trees to produce light crops. It is a fact to be regretted that these defects preclude the growing of this excellently flavored nut on a larger scale. Although the Klondike has largely lost its popularity with growers, small orchards are found here and there in various parts of California. Many of the nuts do not enter the markets through the usual commercial channels, but on account of their flavor are used for home consumption or are sold locally.

43. LA FRANCE

Origin.—This variety probably originated near Oakdale, Calif., from a seedling. Although trees of the variety are found in other sections of California, it has been grown chiefly in the Oakdale district. Most of the La France trees have been grafted to better varieties.

Description

TREE

Exceedingly upright (ratio of width of head to height, $1:1\frac{3}{4}$), usually not a vigorous grower, grows scrubby. Trunk short; branches tend to originate in a bunch rather than being well distributed; bark rough.

Main branches.—Tend to grow short. Branching angle very acute. Many knots. Bark smooth, exfoliates in very large patches.

Twigs.—Rather short. Wood tough. Nodes rather large. Internodes short (seldom over 1 inch long, even on sucker growth). Bark tough, smooth, green, with reddish patches in autumn; thick gray bloom present.

Lenticels.—Medium in number on old wood, few on younger branches; small and very wide in proportion to length (average size on bark 8 to 10 years old, $\frac{1}{16}$ by $\frac{3}{16}$ inch); raised, gray, oval, apexes acute.

Foliage.—Rather scant. Leaves medium in size, fold upward along midrib, curve slightly along margins.

Blade: Size medium ($\frac{5}{8}$ by 2 to $1\frac{1}{2}$ by 4 inches, average, $3\frac{1}{4}$ inches; ratio of width to length, about 1:3); mature leaves resemble I. X. L. in shape. Shape distinctly ovate; widest portion one-third of way from base to apex. Leaves narrower on old wood than on young. Base obtuse; origin of sides symmetrical. Apex acute to acuminate. Margins crenate; bristles short. Upper surface bright, shiny, light green. Lower surface with bloom and a little lighter in color than the upper.

Petiole: Varies much in diameter and some in length (average medium, $\frac{3}{4}$ inch; ratio of length of petiole to length of blade, about 1:4). Upper surface light green, slightly darker than lower. Glands usually some distance down petiole, seldom on blade, seldom opposite, dark brown, wide oval.

Bearing habit.—On spurs, mostly on wood 2 and 3 years old. Many spurs compound, some living longer than one year. Single spurs long ($\frac{3}{8}$ inch) and slender ($\frac{3}{32}$ inch); expand gradually to oval disk ($\frac{5}{32}$ by $\frac{7}{32}$ inch).

NUT

Immature nut.—Medium size (average, $1\frac{3}{4}$ by $1\frac{1}{8}$ by 1 inches). Shape plump, oval. Dorsal edge tends to be straight in middle. Base plump, bluntly rounding, at right angles to axis or nearly so; stem cavity deep ($\frac{3}{32}$ inch). Apex slightly tapering, but blunt; rudiment medium size, very pubescent.

Hull: Outer surface, green, turning yellow while dehiscing; pubescence abundant, long, gray, woolly. Hull thick, dehisces along ventral edge only; usually sides spread open equally; ventral edges tinged with red; inner surface rapidly becomes very dark brown. Ripens late, last of September.

Hulled nut.—(Pl. IX, *C.*) Size medium (average, $1\frac{1}{2}$ by 1 by $\frac{3}{4}$ inches); 140 to 170 nuts to the pound. Percentage of kernel to nut in hand-cracked samples, 35.

Shape: Pointed ovoid; medium plump. Ventral edge curved quite sharply near base, tendency to be rather straight at apex, but varies in this regard, wing varies much in thickness and prominence; may be thin, thick, or medium; may be a mere line or prominent, averages prominent to medium prominent; most prominent near apex. Dorsal edge curved less than ventral, generally straight from middle to apex or at most slightly curving. Base plump, seldom constricted, rounded. Stem scar medium in size, slightly depressed as a rule, round or wide oval, at right angles to axis or slightly sloping ventrally. Ventral edge more or less flat or depressed; when not flat or depressed, ventral shoulder is ridged. Apex distinctly tapering and pointed from middle to immediate apex; wing projects at tip.

Shell: Color varies, usually dark reddish brown; ventral edge and especially wing and apex frequently reddish or pinkish, but not so strikingly as in the Barclay. Hard or standard shell; can not be cracked with fingers. Outer shell of medium thickness; texture varies from spongy to hard and bony. Pits numerous, small to medium in size, usually round in shape, but not always: rather shallow. Ventral edge frequently has depression along one or both sides of the wing; short grooves on ventral edge oblique to wing. Dorsal ridge rather wide and thickly pitted with small shallow pits or marked with very short grooves. Canals medium to large in size, round or oval in shape. Fibers large; network fine to medium. Inner shell quite thick and hard. Inner surface medium brown in color, lighter than outer surface; slightly undulating. Ventral streak light to dark brown, narrow to medium in width; short to medium in length, round at base end, tapering all the way from base to the acute apex.

Kernel: Practically always single. Size medium to rather large (average, 1 by $\frac{1}{2}$ by $\frac{5}{16}$ inch). Shape rather flat, ovate. Dorsal edge longer and less curved than ventral. Base round or slightly truncate; dorsal shoulder rather thin, with tendency to be square; ventral shoulder more plump than dorsal, round or sloping. Apex tapering and usually acute. Pellicle varies in color from light to dark brown; thickly covered with short pubescence; pellicle fold very slight; base scar large, round, rough, slightly protruding. Kernels wrinkle considerably in drying. Flavor dry and strongly tinged with bitter, making the flavor disagreeable. Of use only in almond paste to give other nuts a slightly bitter flavor.

Distinguishing characteristics.—Easily distinguished by the pointed ovoid shape of the dark-brown nut, by the reddish tinge of the ventral edge, and by the bitter flavor of the kernel.

COMMENTS

The variety is not desirable for planting. It is one of the very poorest in quality.

44. LANGUEDOC (PRINCE'S)

Origin.—This is an old variety commonly supposed to have originated in the Province of Languedoc, France, though according to E. Marre[10] the name does not indicate that the variety originated in Languedoc. It was introduced into the United States from France by William R. Prince & Co., of New York, as early as 1843. It was soon sold in California under the name "Prince's." It is interesting to note that this name was later confused with the name "Princess," and even at the present time some growers have Languedoc trees which they miscall "Princess." According to the Pacific Rural Press,[11] the Languedoc almond was widely distributed over California by B. D. T. Clough, of Niles. In 1872 A. T. Hatch planted 200 Languedoc trees near Suisun. The variety was listed for sale by Felix Gillet, of Nevada City, in 1886, and by other nurserymen at a later date. It has been planted in Oregon, Tennessee, and Texas, as well as in California. There are still many Languedoc orchards in various almond-growing sections of California, some of them over 50 years of age. Many of the Languedoc orchards, however, have been removed or grafted over to better varieties.

Description

TREE

Tall, upright (ratio of width of head to height, 1:1$\frac{1}{4}$); vigorous grower. Trunk vigorous and stocky; bark smoother than in many varieties, cracks close together, exfoliates in small flakes.

Main branches.—Long, moderately stocky, upright. Branching angle acute. Old branches with tendency to have flat depressions, somewhat twisty. Wood rather soft and brittle. Bark reddish brown, with patches of gray epidermis; often with long horizontal silver-gray patches, frequently running together and covering large areas; striations common on young branches.

Twigs.—Moderately vigorous; inclined to be stocky, but vary much in this regard. Branching angle acute. Nodes rather large. Internodes variable in length, but inclined to be short ($\frac{3}{8}$ to 1$\frac{1}{2}$ inches). Bark quite thick, medium tough; green with some grayish bloom; tinged with dull red patches in autumn.

Lenticels.—Somewhat variable in number and size. Average medium in number and size (on wood 8 to 10 years old, $\frac{1}{16}$ by $\frac{1}{4}$ to $\frac{1}{8}$ by $\frac{1}{2}$ inch; average, $\frac{3}{32}$ by $\frac{7}{16}$ inch); elliptical, raised, rough, gray, ends acute, extreme apexes tend to be acuminate. On bark 2 to 4 years old, lenticels of medium size, usually less numerous than elsewhere, often inconspicuous on account of the gray epidermis. Lenticels on twigs large, numerous, grayish green.

Foliage.—A little below average in density. Leaves on individual branches medium in number and size, slightly curled, margins wavy.

Blade: Variable in size ($\frac{1}{2}$ by 2 to 1$\frac{1}{4}$ by 3$\frac{3}{4}$ inches), average medium, $\frac{13}{16}$ by 3 inches; ratio of width to length, about 2:7). Shape ovate to elliptical-ovate, average a little narrower than Texas. Base broadly acute; origin of margins symmetrical or slightly unsymmetrical. Apex acute, blade usually but not always slightly tapering from middle to tip. Margins irregularly crenate, occasionally serrate; crenations variable as to depth and length, average rather shallow and short; bristles small, wide, short. Midrib moderately large and prominent. Upper surface of blade dark, deep green. Lower surface dull light green.

Petiole: Length variable ($\frac{1}{2}$ to 1$\frac{1}{4}$ inches; average quite long, 1 inch; ratio of length of petiole to length of blade, 1:3). Thickness variable; quite flexible. Pale green on lower surface, light green on upper, tinged with dull red in autumn. Groove wide, rather shallow. Glands, one to four, commonly two, small to medium size, yellowish or grayish, round or oval.

Bearing habit.—Average light, distinctly an alternate bearer. Bears on spurs on wood 2 to 4 years old, mostly on wood 2 and 3 years old. Spurs frequently compound and very long (as much as 2 inches) and thick ($\frac{3}{8}$ inch). Single spurs long ($\frac{1}{4}$ to $\frac{1}{2}$ inch) and slender to medium ($\frac{3}{16}$ to $\frac{1}{8}$ inch). Disk small (diameter $\frac{1}{8}$ to $\frac{3}{16}$ inch); quite round. Occasionally some nuts are borne on laterals. Buds free, large, long, tapering; scales large; dark brown, rather thin, somewhat brittle, with considerable long gray pubescence on edges. (Buds generally slightly longer than in Texas.)

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[10] Marre, E. Les meilleures variétés d'amandes. *In* Prog. Agr. et Vit., t. 53, p. 137–144, illus. 1910.

[11] Anonymous. Almond culture. *In* Pac. Rural Press, v. 4, p. 329, illus. 1872.

NUT

Immature nut.—Size small to medium (average, $1\frac{1}{2}$ by 1 by $\frac{7}{8}$ inches). Shape irregular; plump (but varies in plumpness); ovate; part on ventral side of axis ovate or elliptical, part on dorsal side oblong-elliptical. Ventral edge curved; ventral ridge prominent ($\frac{1}{4}$ inch wide; $\frac{1}{8}$ to $\frac{3}{16}$ inch high), depressions paralleling it on each side deep and crooked, suture varies as to direction; may run straight down middle of ridge or may run obliquely. Dorsal edge straight, irregularly ridged; grooved each side of dorsal ridge. Base usually slightly sloping dorsally; deeply grooved; stem cavity shallow ($\frac{1}{32}$ inch); narrow ($\frac{1}{4}$ to $\frac{3}{8}$ inch). Apex round pointed; irregularly grooved; style falls early; rudiment very small, pubescent.

Hull: Outer surface green, covered abundantly with moderately coarse, short, gray, felty pubescence; many irregular grooves on surface. Dehisces first on ventral edge; may or may not crack open on dorsal edge; when open on dorsal edge as well as ventral, the halves spread open at apex. Date of dehiscence late, September 15 to October 10.

Hulled nut.—(Pl. IX, *D.*) Vary in size, quite small to medium (1 by $\frac{3}{4}$ by $\frac{1}{2}$ to $1\frac{1}{2}$ by $1\frac{1}{8}$ by $\frac{3}{4}$ inches). Number of nuts to the pound, 170 to 225. Percentage of kernel to nut, hand cracked, 50.

Shape: Quite plump, wide ovate; nut rather wide in proportion to length; axis one-third way from ventral to dorsal edge; (edgewise view ovate, with bulging sides). Ventral edge plump, sharply curved, curved very much at base and apex. Wide longitudinal depressions along ventral edge, accompanied by ridges especially prominent. Wing of medium thickness, prominent to very prominent. Dorsal edge plump, slightly curved, but curving sharply at apex; dorsal ridge distinct to prominent, wide to narrow; suture line usually distinct. Base plump, or sharply rounded, somewhat constricted as a rule, truncate, at right angles to axis, or slightly sloping ventrally, sometimes dorsally; stem scar medium to quite large, wide oval, slightly depressed. Apex varies; mostly blunt, wide, and rounding, but sometimes pointed; usually plump. Viewed edgewise, sides usually bulging.

Shell: Soft, but some too hard to crack with fingers; varies in same sample; outer shell very hard or slightly crumbly, light brown or yellowish brown in color. Pits rather numerous, mostly round, medium in depth, small to medium in size, found all over sides, on ventral and dorsal edges, but not on base within one-fourth inch of stem scar. Nuts are characteristically marked with ridges or corrugations, the ridges and grooves extending downward from base end a short distance, but one or two extend down the nut on one or both sides of wing, giving the ventral edge a depressed appearance due to the groove along its edge and the ridge outside. Very short distinct grooves run out on wing nearly to its edge. Canals medium size. Fibers usually round, medium in size, generally light brown in color. Inner shell medium in thickness, hard. Inner surface of shell light brown in color, but darker than outer shell; slightly undulating. Ventral streak dark sepia in color; long; varies in width, medium to wide; base tapering, but blunt.

Kernel: Some doubles (2 to 4 per cent). Size medium (average, $\frac{7}{8}$ by $\frac{1}{2}$ by $\frac{3}{8}$ inch). Somewhat irregular in shape, very plump, short, ovate, or cuneiform-ovate. Dorsal edge longer than ventral. Ventral edge curves more than dorsal. Base rounding or truncate; dorsal shoulder usually round and thinner than ventral (base from dorsal shoulder to base scar often straight, approaching the axis at right angles); ventral shoulder plump, sloping very abruptly downward from base scar. Widest portion of kernel near base. Apex two-thirds of nut decidedly cuneiform, or at least somewhat pointed, but plump. Pellicle cinnamon brown in color, thin, rather tender; pubescence little in quantity and so short as to give most of the pellicle a smooth appearance, most abundant along ventral edge and apex; veins dark brown and indistinct; pellicle fold small, along apex third of ventral side; base scar distinct, slightly elevated, dark brown, roundish. Flavor rather flat, considerable oil present. Flavor not very attractive to most people.

Distinguishing characteristics.—Ventral edge of nut with very prominent longitudinal depressions and ridges parallel with wing; wing very prominent, always prominent at base and apex, curving very suddenly at apex; usually approaching the axis at nearly right angles; dorsal edge at immediate apex sharply and shortly recurving; flange with short grooves; base constricted; stem scar wide, variable in shape, i. e., at right angles to axis or slightly sloping either dorsally or ventrally; kernel short, plump, dorsal shoulder often humped.

The shape of this nut places it in the group including the Ballard, Drake, Languedoc, Lewelling, Pistache, and Texas. The Languedoc is easily distinguished from any of these varieties by its very prominent wing, having a peculiar curve at the apex, and by the prominent longitudinal depressions and ridges on its ventral edge.

Although the Languedoc is so often confused with the Texas, there is really no need for uncertainty. Much of the confusion doubtless arises from the fact that many of the supposed Texas trees are actually Languedoc. In the Languedoc nut the wing is always thin and prominent; very prominent and much curved at the apex, which is never the case in the Texas. The longitudinal depressions and ridges are more prominent on the ventral edge of the Languedoc nut than in any other variety. The depressions and ridges are very slight on the true Texas, but occur in varying degrees on Languedoc seedlings. The Languedoc nut is longer in proportion to width than the Texas. The Texas kernel is slightly bitter in flavor, like a peach kernel, which is never the case with the Languedoc.

COMMENTS

The chief point in favor of this variety is its late blooming habit. It is a shy bearer, however, and frequently an alternate bearer. The nuts and kernels tend to be small except when the crop is light, and they are of mediocre quality. The trees of this variety are apparently long lived and are thrifty growers. The Languedoc almond became unpopular after better varieties began to be produced. The variety certainly should not be recommended for future plantings except for home use in sections where all except the late-blooming varieties are apt to be injured by late spring frosts. It is interesting to note that the Languedoc almond is intersterile with the Texas, at least in some districts. This fact suggests the close relationship of the two varieties.

OTHER TYPES OF LANGUEDOCS

Several types of almonds are grown in California which differ only slightly from the Languedoc. They are probably seedlings. One of these resembles the Languedoc in every way except that the shell is thinner and the nut a little more pointed at the base. Another type differs from the true Languedoc in being more oval in shape and having a longer kernel. Still another type has fewer ridges, a much less prominent wing, a more pointed apex, a kernel with a more pointed apex, a greater amount of pubescence, and sweeter flavor. While some of these types are slightly superior to the true Languedoc, they are so much inferior to the Hatch and certain other varieties as to merit no consideration.

45. LA PRIMA

Origin.—The La Prima was one of the four promising seedling trees (the other three being the Nonpareil, I. X. L., and Ne Plus Ultra) resulting from the planting of 2,000 bitter-almond seeds by A. T. Hatch, of Suisun, Calif., in 1879. Mr. Hatch finally eliminated La Prima from his list, but not before the variety had been quite widely distributed in California. Although as a commercial variety the La Prima has almost disappeared, there are still commercial orchards in the Lodi-Acampo district, and occasional trees are found in the other districts of northern California. The nut frequently enters the market as Ne Plus Ultra, which it resembles.

Description

TREE

Large, vigorous grower, quite spreading (ratio of height of head to width, 1 : 1¼). Trunk stocky, short, tends to grow somewhat crooked; bark rough.

Main branches.—Length moderate, quite stocky, somewhat drooping, slightly crooked. Branching angle obtuse. Wood soft. Old bark somewhat rough, but has smooth areas, reddish gray; exfoliates in large patches; on 8-year-old wood and younger, the bark is smooth as a rule.

Twigs.—Tend to grow rather short; moderately stocky; branching angle acute. Nodes small. Internodes short (¼ to ½ inch). Bark moderately thick; rather brittle; smooth; greenish; turning reddish in late summer.

Lenticels.—On old bark very wide and short; oval with increasing and evenly curved sides from middle to apexes. Ends pointed, acute; depressed: dark gray in color. Lenticels on wood 8 to 10 years old, very numerous, very wide, short, elliptical, with bluntly pointed ends (size ⅛ by ¼ inch or slightly longer); brownish gray. On wood 2 to 4 years old, lenticels almost round, very numerous, gray, or brownish gray, slightly raised. On twigs, lenticels very numerous, small, round, on level with the surface of the bark. (See Pl. XVII, *B.*)

Foliage.—Moderately dense. Leaves quite numerous, large.

Blade: Large (¾ by 3 to 1⅛ by 4¼ inches; average 1 by 4 inches; ratio of width to length, about 1:4). Shape long ovate, widest part one-third to one-half of distance from base to apex. Base obtuse; origin of sides generally unsymmetrical. Apex tapering, pointed, sometimes edges straight or incurving very slightly at tip; immediate apex very sharp and pointed. Margins gently and evenly curved; crenations shallow; bristles dark, wide, short. Midrib prominent, very light green, almost white on under side. Main veins distinct. Lower surface of blade grayish green. Upper surface medium deep green.

Petiole: Length medium for size of blade (1 to 1¼ inches; ratio of length of petiole to length of blade, about 1:4). Very light green, tinged with red at base in autumn. Groove wide, deep. Glands two to four, sometimes six, on petiole near base of blade, round or reniform, usually with flat tops, generally yellowish gray, later with dark spot in center. Occasionally small stipulate glands appear.

Bearing habit.—A moderately good bearer and quite regular in bearing habits. Bears mostly on spurs on wood 2 and 3 years old. Spurs average medium in diameter (⅛ inch); length medium to long (¼ to ⅝ inch); disk about ¼ inch in diameter. Buds long, pointed, outer scales large. La Prima nuts are hard to hull if allowed to remain on the tree too long.

NUT

Immature nut.—Size quite large (2 by 1¼ by 1 inches). Shape rather flat, long oval or oval ovate, part on ventral side of axis oval or oval ovate; part on dorsal side long oval. Ventral edge much curved, smooth, or with slight suggestion of ridge; suture depression shallow ($\frac{1}{64}$ inch) and narrow ($\frac{1}{16}$ inch). Dorsal edge gently curved, curves most near apex. Base flat, ventrally sloping, cavity $\frac{1}{16}$ inch deep, $\frac{5}{16}$ inch across. Apex bluntly pointed, slightly depressed on ventral side of rudiment; style drops moderately early; rudiment short.

Hull: Outer surface green, turning to yellow green, and finally to brown; pubescence abundant, coarse, short, felty, gray. Color of inner surface at first light green, changing rapidly to dark brown. Dehisces on ventral edge first; frequently edges are pink in early stage of dehiscence. Ventral edges bulge out in the middle and curve inward at apex and base. Dehiscence frequently takes place on dorsal edge as well as on ventral, and when such is the case the halves of the hull do not become entirely separate but remain attached to each other at the base or at both base and apex. Ripens August 5 to 30.

Hulled nut.—(Pl. IX, *E.*) Size variable, medium to large (average, 1½ by ⅞ by ½ inches), frequently larger than Ne Plus Ultra. Number of nuts to the pound, 200 to 250. Percentage of kernel to nut in hand-cracked samples, 52.

Shape: Slightly variable; usually oval, rather flat (edgewise view, ovate). Ventral edge curved entire length, curved most at base and apex; wing thin to medium in thickness, prominent, except at immediate base, ends prominently at apex. Dorsal edge gently curving, curving sharply at apex; dorsal ridge narrow, frequently prominent; dorsal edge more plump than ventral. Base somewhat pointed and constricted, sloping ventrally, stem scar variable in size, usually medium, round or oval, sloping ventrally. Apex bluntly pointed, ventral and dorsal edges curve quite sharply at apex; apex resembles Ne Plus Ultra, but is more blunt.

Shell: Varies in color and texture on same tree; light grayish brown to medium dark brown. Averages in soft-shell class. Some nuts, however, are so hard as to be difficult to crack with the fingers. Outer shell quite thick, may be hard or soft, crumbly, and brittle. Pits numerous to medium in number, medium to large in size, variable in shape. Medium shallow to deep. Finely grooved at ventral edge and on base. Grooves on base half of edge nearly parallel with wing. Canals small to large. Fibers small to large; network rather coarse. Inner shell thin to medium; hard. Inner surface undulating, medium to dark brown in color. Ventral streak light to medium brown in color, medium width, short, blunt base and abruptly acute apex.

Kernel: Rather large (average, 1⅛ by ½ by ¼ inches). Doubles common (16 per cent). Rather plump. Oval or oval-ovate. Edges frequently straight near middle. Dorsal edge longer than ventral. Base rounding; dorsal shoulder round or square; ventral shoulder sloping. Apex usually plump and blunt, but sometimes acute. Pellicle medium brown to dark brown, medium in thickness; covered with short pubescence; veining generally distinct; pellicle fold usually small and short, extending one-fourth to one-third the way from apex to base; base scar small to medium, usually prominent, round, oval, or triangular. Kernel wrinkles considerably in drying. Flavor fairly good with very slight bitter tinge.

Distinguishing characteristics.—Shape oval, pointed and constricted at base, stem scar ventrally sloping, wing prominent, size of nuts variable, ventral streak short, some doubles (12 to 20 per cent); flavor slightly bitter.

This variety is frequently mistaken for the Ne Plus Ultra, but the apex of the nut in La Prima is more blunt as a rule; the kernels have less pubescence and a characteristic bitter flavor.

COMMENTS

The quality of the kernel, size of the nut, and average yield of the La Prima are superior to those of the Ne Plus Ultra. The variety appears to be quite as good a pollinizer for the Nonpareil and I. X. L. as is the Ne Plus Ultra. The nuts of La Prima, on the other hand, vary in size and are difficult to handle properly at harvest time. If knocked early, they do not dry well, but are very apt to mold. If harvested late, most of the nuts will be sticktights and difficult to hull. On account of these defects the variety is not liked by growers.

46. LASSEN

Origin.—The Lassen was propagated from a seedling by A. M. Newland, of Colusa, Calif., about 1888. It was named after Peter Lassen, who ran the first trail to Mount Lassen and was the first white man in that section of California. Trees of this variety were planted for the most part in the Colusa district, where a number of them are still to be found. There are also a few trees in the Davis, Winters, and Lodi sections. Some growers confuse the variety with Routier.

Description

TREE

Quite upright; moderately vigorous grower; branches grow straight. Foliage below average in density.

Bearing habit.—Averages light crops. On spurs, mostly on wood 2 to 4 years old. Spurs medium in diameter (⅛ inch) and in length (¼ inch). Disk nearly round, ¼ inch in diameter.

NUT

Immature nut.—Size small to medium (averages 1½ by 1 by ¾ inches). Shape ovate. Ventral edge curving, usually without ridge or a very slight one; suture depression a mere line. Dorsal edge curving less than ventral. Base broad, round, slightly sloping dorsally. Apex bluntly pointed; style remains until late.

Hull: Outer surface green, turning yellowish as it dehisces; pubescence abundant, coarse, short, gray, woolly. Inner surface pale green, rapidly turning brown as hull opens. Dehiscence starts on ventral edge. Dorsal edge cracks from base a short distance downward. One half of hull usually dries much faster than the other. Ventral edges roll inward, curving inward at apex. When thoroughly dehisced hulls have an open, twisted appearance. Dehisces August 8 to 25.

Hulled nut.—(Pl. X, *A*.) Size small to medium (average, 1¼ by ⅞ by ⅝ inches). Number of nuts to the pound, 200 to 250. Percentage of kernel to nut in hand-cracked samples, 45.

Shape: Medium in plumpness, wide ovate, axis one-fourth the distance from dorsal to ventral edge; (viewed edgewise, long ovate). Ventral edge much curved; wing thin, prominent, quite prominent at base. Dorsal edge plump;

curved gradually, slightly recurving at extreme apex; dorsal ridge wide, not prominent. Base plump, wide, round, dorsal shoulder sharply rounded and gently sloping; ventral shoulder gently rounding, base scar medium in size, wide oval, seldom depressed, slightly dorsally sloping. Apex tapering; ventral edge gently curved; dorsal edge gently curving; wing medium prominent at apex, ending in sharp point.

Shell: Soft; outer surface light brown; outer shell, quite thin, porous, crumbly. Pits few, medium to large, mostly round. Fine grooves on ventral edge and base. Canals medium sized; inclined to be round. Fibers medium size. Inner shell thin, hard, medium brown. Inner surface undulating; frequently streaked with dark-colored stripes. Ventral streak dark brown, very wide; base end widely acute.

Kernel: Some doubles. Size small to medium (average, 1 by $\frac{9}{16}$ by $\frac{3}{8}$ inch). Shape ovate. Ventral edge curved more than dorsal. Base plump; dorsal shoulder plump, curved, and very slightly sloping; ventral shoulder plump, sharply rounded. Apex bluntly tapering; pellicle light brown, thin, tender, with small amount of short fine pubescence; veins distinct or indistinct; pellicle fold small, on apex third of ventral edge; base scar small to medium in size, prominent, dark brown, wide oval. Flavor flat, tasteless, poor.

Distinguishing characteristics.—The following combination of characteristics makes it possible to distinguish this nut from other varieties: Shape ovate; base plump, with stem scar slightly sloping dorsally, wing fairly prominent right up to base scar; dorsal edge curved most at base and recurving slightly at apex; pits few in number; ventral streak wide, with widely acute base end; kernel ovate, with plump, square, slightly sloping dorsal shoulder, and short rounding ventral shoulder; pellicle light brown with scanty short pubescence.

This nut is sometimes confused with the I. X. L.; however, the outer shell is more crumbly, the pits are fewer, the apex is more pointed and slightly recurving on the dorsal side, the wing is less pronounced, the kernel is much longer in proportion to width, the dorsal shoulder of the kernel is much more plump and less humped, and the pellicle is lighter in color than in the I. X. L.

It resembles the Barclay somewhat, but the Barclay has a harder outer shell, more blunt apex, larger kernels, more cuneiform shape, and a dark-brown pellicle having more pubescence.

COMMENTS

The early-blossoming habit of this variety makes it liable to frost injury, consequently its crops average light. The flavor of the kernel is inferior. When the nuts begin to dehisce they loosen from the twigs and winds may cause them to drop to the ground. This necessitates picking them up by hand. The Lassen is inferior to the Hatch varieties and has not been popular with growers.

47. LEWELLING (LEWELLING'S PROLIFIC)

Origin.—Originated by John Lewelling, near Oakley, Calif. It proved to be a heavy bearer and a good pollinizer for the Hatch varieties (I. X. L., Nonpareil, and Ne Plus Ultra) and was planted extensively in the Oakley and Antioch districts. After 1890 the variety was for sale by all the leading California nurseries. Not only has it been widely distributed to every almond-growing section in California, but has been tried out in Michigan, Kansas, Nebraska, Utah, Idaho, Texas, and in Australia. At the present time it is one of the leading commercial varieties in California and is grown in every district.

Description

Slow growing, scraggly, spreading (ratio of height of head to width, 1:1$\frac{1}{3}$). Trunk small; bark very rough, cracks close together; exfoliates in small patches.

Main branches.—Short, quite stocky. Branching angle wide (nearly right angle; scraggly, somewhat like Drake. Wood medium tough; medium hard; many knots. Bark on old branches very rough, cracks deep; exfoliates in large flakes or patches; color dark red, covered with gray epidermis. On young branches patches of silver-gray color often run together and practically exclude the red color; young branches frequently heavily striated.

Twigs.—Short, straight, stocky, rigid. Branching angle wide. Wood quite tough and hard. Nodes moderately large. Internodes usually rather short (½ to 1 inch). Bark light green, tinged with dark brownish red in fall.

Lenticels.—Usually numerous, medium in size (on wood 8 to 10 years old, $\frac{1}{16}$ by $\frac{3}{16}$ to $\frac{3}{32}$ by ¼ inch); raised, rough, gray, wide, short, ends bluntly acute, extreme apexes sometimes short, acuminate. Frequently inconspicuous on young growth on account of striations. On twigs, lenticels numerous, medium in size, gray, conspicuous.

Foliage.—Moderately dense; in some seasons less dense than in others. Leaves on individual branches medium in number and size, tend to recurve and to curve up along midrib.

Blade: Size averages medium, but varies somewhat (⅝ by 2 to 1⅛ by 3½ inches; average, 1 by 3 inches; ratio of width to length averages 1:3). Shape rather wide ovate or elliptical; widest part one-third of way from base to apex. Base obtuse to acute, frequently rounding; origin of margins symmetrical or unsymmetrical. Apex broadly acute, occasionally tapering slightly, sides curving gradually. Margins irregular crenate; crenations generally coarse; bristles long, gray, narrow. Midrib somewhat slender, medium prominent, light green. Veins distinct. Color of upper surface of blade dull, medium dark green. Lower surface dark green, slightly lighter than upper, but darker than in most other varieties, with some bloom.

Petiole: Rather long for size of leaf (average, ⅞ inch; ratio of length of petiole to length of blade, about 2:7); varies in thickness, average somewhat stocky. Upper surface medium green, tinged with red in autumn. Groove deep, medium width, glands two to four, usually two, commonly three, large, brownish, yellow, or grayish, globular, or oval protruding glands on petiole near base of blade or on lower crenations of blade.

Bearing habit.—Exceedingy heavy bearer, so much so that the tree is stunted by the heavy crop production. Spurs in clusters on wood 1 to 5 years old. Compound spurs long (½ to 1½ inches), thick (⅛ to ¼ inch). Single spurs long (¼ to ⅜ inch) and thick (⅛ to ¼ inch); disk large, wide-oval ($\frac{3}{16}$ by $\frac{3}{16}$+ inch). Buds moderately large, free, plump, tapering; scales large, thin, medium brittle, dark brown, with considerable short pubescence on edges.

NUT

Immature nut.—Medium size (average, 1$\frac{3}{16}$ by 1⅛ by ⅞ inches). Shape plump, broad oval to ovate, part on ventral side of axis ovate, part on dorsal side oblong-ovate or oval. Ventral edge much curved; ventral ridge pronounced (⅛ inch high, ¼ to ⅜ inch wide); suture line in middle of ridge, shallow and narrow. Dorsal edge gently curved, less curved in middle than elsewhere; slightly bulged or ridged at apex. Base broadly rounding, slightly sloping dorsally, lightly grooved, some grooves extending over sides of hull. Cavity very shallow ($\frac{1}{64}$ inch). Apex rounding like point of egg or widely wedge-shaped; style adheres until late in season.

Hull: Outer surface pale green, sometimes a very slight pink tinge on ventral edge and apex; pubescence abundant, short, coarse, woolly. Inner surface pale green as dehiscence starts, turning to light brown later. Dehisces first on ventral edge, usually from apex upward; quite common for dehiscence to continue on dorsal edge, either partially or fully; other cracks frequently occur at apex. Halves open at apex, usually remaining attached at base. Date of dehiscence August 5 to September 15, depending upon locality and season.

Hulled nut.—(Pl. X, *B.*) Size medium (1¼ by 1 by ¾ inches). Number of nuts to the pound, 160 to 200. Percentage of kernel to nut in hand-cracked samples, 40.

Shape: Roundish ovate or round oval, nut wide in proportion to length, plump (viewed edgewise, wide-ovate, frequently with sides unsymmetrical). Ventral edge much curved, plump, wing thick, prominent, tapering to a thin edge; less prominent at base than elsewhere. Dorsal edge curved less than ventral, sharply curved near apex; dorsal ridge medium in width, prominent. Base very plump, truncate; at right angles to axis or slightly sloping dorsally; stem scar usually small, oval. Apex plump, wide, bluntly pointed, wing ending in sharp point.

Shell: Soft; too hard to crack with the fingers; light to dark brown, frequently with reddish brown tinge. Outer shell thick and quite hard. Inner shell thin, hard, and tough. Small amount of spongy material between the inner and outer shell. Canals and fibers small to medium in size. Pits few on ventral edge, numerous on dorsal edge, medium number on sides, mostly round, variable in depth, medium to large in size on sides, small on dorsal edge. Dorsal ridge pitted or grooved with fine, short grooves. Surface between dots may be smooth or stippled. Ventral edge grooved, short grooves at base. Inner surface of inner shell medium brown in color and somewhat undulating. Ventral streak medium brown in color, medium length, wide, with bluntly tapering base.

Kernel: Many doubles (40 to 50 per cent). Size small to medium (average, $\frac{3}{4}$ by $\frac{9}{16}$ by $\frac{3}{8}$ inch). Frequently irregular in shape. Single kernels quite plump, generally wide, short, ovate. Both dorsal and ventral edges increasing in curve from middle to sharp point of apex and nearly equal in length. Base round; dorsal shoulder round or slightly humped; ventral shoulder round. Apex plump but pointed. Pellicle usually light brown in color, thin; veining distinct; pubescence very short, pellicle fold small on apex third or half of ventral edge; base scar small, round, very dark brown and well up on base. Flavor slightly sweet, pleasant, quite good.

Distinguishing characteristics.—On account of its close resemblance to some other varieties it is difficult to give, in a short space, distinguishing features of this nut. The small, low, scraggly tree is, of course, easily identified.

The nut belongs to the group including the Ballard, Drake, Languedoc, Lewelling, Pistache, Spagon, and Texas. In shape it closely resembles the Drake; for points of difference see the Drake. It is easily distinguished from the Languedoc; see description of Languedoc. It is distinguished from Spagon and Pistache by the very small size of these varieties. It is most easily separated from the Texas by its sweet kernel, the kernel of the Texas being distinctly bitter. Also, the Lewelling has many double kernels.

COMMENTS

The large proportion of double kernels and the slow, scraggly growth of the tree are the main defects of the variety. The fact that it is a good pollinizer of the Hatch varieties, its prolific bearing tendency, and the sweet, pleasant flavor of the kernel are points in its favor. It is superior to the Drake in the latter respects, but the nuts average somewhat smaller. It does well in the Oakley district, where the Hatch varieties do not bear well. It is probable that the Lewelling will always come into the market as a cheap nut, and for that reason further planting of the variety on a large scale is not advisable.

48. LONG I. X. L.

Origin.—Undoubtedly a seedling originated in the Oakley district of California. The variety has been grown in the section for a number of years, plantings having been made since 1910. It bears well and is much better suited to the district than the I. X. L. It is not grown commercially elsewhere. In the Oakley district this variety is called the Long I. X. L., while the true I. X. L. is frequently referred to as the Short I. X. L.

Description

TREE

Medium upright (ratio of height of head to width, 1:1), branches somewhat spreading, rather vigorous grower. Trunk does not twist as in the true I. X. L. and tree is less upright.

Main branches.—Somewhat upright, rather long, medium stocky. Branching angle moderately acute; many flat depressions; a number of knots. Wood slightly brittle. Bark a striking yellowish brown, frequently with thin gray epidermis; exfoliates in small flakes; young branches commonly striated.

Twigs.—Long, vigorous, stocky, straight, rigid. Branching angle moderately acute. Wood somewhat brittle. Nodes large, giving twigs a zigzag appearance. Internodes medium in length ($\frac{1}{2}$ to $1\frac{1}{2}$ inches). Bark yellowish green, much bloom, reddish patches in autumn.

Lenticels.—Variable in size (on bark 8 to 10 years old, $\frac{1}{32}$ by $\frac{1}{16}$ to $\frac{1}{16}$ by $\frac{1}{4}$ inch). Wide oval; raised, gray, longitudinal cracks through middle; ends bluntly acute.

Foliage.—Rather dense. Leaves numerous on individual branches, rather large; flat, or slightly recurved at tip.

Blade: Average size slightly above medium (1 by 3 inches, varies from $\frac{7}{8}$ by 2 to $1\frac{1}{4}$ by $3\frac{1}{2}$ inches; ratio of width to length, about 1:3). Shape ovate, some ovate-elliptical. Base very obtuse; origin of sides symmetrical or nearly so. Apex acute to bluntly acute; apex half to two-thirds of blade tapering, making shape somewhat similar to I. X. L. Margin much curved at base, gently curved or straight on sides; crenations deep, short; bristle short. Upper surface smooth, rich dark green. Lower surface light green.

Petiole: Varies in length (average about medium for size of blade, $\frac{7}{8}$ inch; ratio of length of petiole to length of blade, about 2:7); large in diameter, rigid, pale green, tinged with red in fall, groove narrow, deep. Glands two to four, usually two, small, globular, yellowish.

Bearing habit.—On spurs, mostly on wood 1 to 3 years old. Some nuts borne on laterals. Spurs large in diameter ($\frac{3}{16}$ to $\frac{1}{4}$ inch) and medium in length ($\frac{1}{4}$ inch). Disk wide oval, $\frac{1}{4}$ by $\frac{5}{16}$ inch. Buds free, slightly flattened, rather short, slightly constricted at base, apex blunt; scales wide, thick, brown, with grayish pubescence on edges.

NUT

Immature nut.—Medium in size (average, $1\frac{5}{8}$ by $1\frac{1}{8}$ by 1 inches). Shape long ovate, more like Nonpareil than like I. X. L. Ventral edge much curved, pinkish brown before dehiscence, ventral ridge none or very slight. Suture line narrow ($\frac{1}{32}$ inch), quite shallow ($\frac{1}{64}$ inch). Dorsal edge gently curved. Base at right angles to axis; ventral shoulder round; dorsal shoulder lacks prominence; cavity $\frac{1}{32}$ inch deep. Apex bluntly pointed; style falls early; rudiment small. Outer surface of hull bright green, turning yellowish and finally brownish or reddish brown; pubescence abundant, short, fine, gray, felty.

Hull: Inner surface turns yellowish and finally dark brown after dehiscing for a time; dehisces along ventral edge; dorsal edge frequently cracks at base slightly; ventral edge curls outward in middle, the apex curling slightly inward. Ripens August 1 to 21.

Hulled nut.—(Pl. X, *C*.) Size somewhat variable, medium to quite large (average, $1\frac{1}{2}$ by 1 by $\frac{5}{8}$ inches); slightly smaller than I. X. L. Some gummy nuts. Number of nuts to the pound, 200 to 250. Percentage of kernel to nut in hand-cracked samples, 40.

Shape: Ovate; rather flat to slightly plump, like the I. X. L., but not so wide in proportion to length. Axis near middle. Ventral edge curves regularly, closely resembling the I. X. L. in this respect. Wing varies, but is usually prominent and thin, edge clear cut and regular in curve, ending in a point at the apex similar to I. X. L., except curve is more gradual near apex. Dorsal edge gently curved, sharply curving in at apex. As a rule the dorsal ridge is not quite so prominent as in the I. X. L., but resembles it otherwise; dorsal suture line usually visible. Base resembles I. X. L., at right angles to axis, or frequently sloping ventrally; thin at stem scar; stem scar rather small and narrow, similar to the I. X. L.; very slightly depressed; dorsal shoulder sometimes a little above stem scar and rather square. Ventral shoulder sloping or curved gradually. Apex rather plump until immediate tip is reached, when it becomes thin and ends in a thin prominent point in conjunction with the wing. The apex is slightly more acute in the I. X. L. and is scimitarlike.

Shell: Soft; usually rather dark brown. Pits rather small, numerous, and deep, mostly round, smaller than in I. X. L. Surface between deep pits coarsely stippled, more so than in I. X. L. and firmer in texture. Deep narrow grooves at base. Very short, wide oblique grooves on ventral edge, run off at obtuse angle at apex. Outer shell soft and crumbly. Canals large, but fibers rather small. Inner shell thin. Inner surface light brown, slightly undulated, undulations running longitudinally. Ventral streak long, medium width, acutely rounding at base (not nearly so sharp as in the I. X. L.); light brown, but darker than inner surface. Two narrow ridges run along the ventral streak similar to the I. X. L., but they are more prominent in the Long I. X. L.

Kernel: Very few doubles. Smaller than I. X. L. and longer, but resembles it much. Size medium (1 by $\frac{9}{16}$ by $\frac{1}{4}$ inch). Shape flat, and wrinkles much upon drying. Dorsal edge gently curving and not quite so thin as in I. X. L. Ventral edge more curving than dorsal. Base rounding as a rule; ventral shoulder usually round, and thicker than in I. X. L. Apex quite obtuse, does not have the scimitar appearance of I. X. L., extreme apex wide and not prominent. Pellicle thin, light brown; covered with short pubescence; veins large, dark brown, distinct when fresh, but not distinct when old; pellicle fold small, thin. Flavor rather dry, pleasantly sweet, and nutty.

Distinguishing characteristics.—Resembles I. X. L. closely. Nut narrower in proportion to length than in I. X. L., apex more acute, pits smaller and deeper, base end of ventral streak not acuminate, as is the case in I. X. L.; kernel smaller, narrower in proportion to length, dorsal shoulder of kernel lacks hump so characteristic of I. X. L., and is thicker.

COMMENTS

Since this variety yields better in the Oakley district than the I. X. L., it is popular there. Extensive planting of the Long I. X. L. is not advisable in other sections of the State at the present time.

49. MARIE DUPREY

Origin.—Introduced from France, propagated and first distributed by Felix Gillet, of Nevada City, Calif. The variety is now found only occasionally.

Description

Hulled nut.—(Pl. X, *D*.) Size rather large (average, 1½ by 1 by ⅝ inches). Percentage of kernel to nut in hand-cracked samples, 35.

Shape: Moderately plump, crescent shape, or nearly the shape of a half circle; axis very close to dorsal edge. Ventral edge nearly circular in curve; wing thin and prominent throughout ventral edge. Wide longitudinal depressions common on ventral edge. Dorsal edge plump, straight, or curved slightly inward; dorsal ridge narrow and inconspicuous. Base medium plump; ventral shoulder round; dorsal shoulder drops off suddenly from edge of stem scar; stem scar small, nearly round, at right angles to axis or very slightly sloping either dorsally or ventrally. Apex blunt, with dorsal edge straight or slightly recurved and ventral edge much curved.

Shell: Soft; outer shell rather thin, soft, crumbly; outer surface light reddish brown. Pits few, large, deep, vary in shape. Canals small. Network of fibers fine. Fibers small. Inner shell medium in thickness, rather hard, with light-brown inner surface. Ventral streak medium brown to dark brown in color; very wide; base blunt.

Kernel: Many double kernels. Size medium to quite large (average, 1⅛ by ½ by ¼ inches). Shape long, narrow, crescent shape; i. e., resembling half of a long oval. Dorsal edge straight and thin. Ventral edge curved. Base round with sharply rounded dorsal shoulder and rounded, slightly sloping ventral shoulder. Apex thin, rather blunt, straight on dorsal edge, much curved on ventral. Pellicle dark brown, heavily covered with coarse pubescence; pellicle fold small, on apex third of ventral edge; base scar small, dark brown, heavily pubescent, nearly round, rather inconspicuous.

Distinguishing characteristics.—Easily distinguished from all other varieties by the large crescent-shaped nut and long, narrow, crescent-shaped kernel with heavy pubescence.

COMMENTS

This is a nut of poor quality and not to be recommended. Very few trees of this variety are grown at the present time.

50. NE PLUS ULTRA

Origin.—A budded tree on the A. T. Hatch ranch, Suisun, Calif., died at the top and produced from the root a sprout which bore unusually well. Mr. Hatch budded a number of trees from this sprout and later introduced the variety as one of his three best. (For a more complete history of the Hatch varieties, see I. X. L.). The Ne Plus Ultra has been sold by all the leading nursery firms in California and by many in other States. It is one of the most extensively planted commercial almonds in California. It has been introduced into Oregon, Washington, Utah, Nevada, Arizona, New Mexico, Texas, and other States and also into Australia.

Description

TREE

Vigorous grower, spreading (ratio of height of head to width, 1:1⅓). Trunk rather stocky, quite straight; bark moderately rough, cracks close together, exfoliates in small flakes.

Main branches.—Rather long; vigorous, medium stocky. Branching angle medium acute. Wood medium tough; medium soft. Bark reddish brown, covered with varying amounts of gray epidermis; somewhat rough and cracked on old branches, frequently with numerous fine transverse lines; exfoliates on older branches in large flakes, striations common on young branches.

Twigs.—Medium vigorous growth, rather stocky and rigid; grow straight or gently curved. Branching angle moderately acute. Wood rather tough. Nodes rather small. Internodes medium in length (½ to 1½ inches). Bark light green, more or less covered with waxy bloom; dark-red patches in autumn.

Lenticels.—Numerous; vary in size on same aged bark (on wood 10 to 12 years old, 1/16 by ⅛ to 1/16 by 5/16 inch, average, 1/16 by ¼ inch; on bark 7 to 9 years old, average, 1/16 by 3/16 inch); oval or slightly diamond shaped; wide and short, apexes bluntly acute; raised, gray, surface less rough than in many other varieties. On young growth, variable in number, small. On twigs, numerous, rather large, grayish green.

Foliage.—Quite dense; leaves very large, rather flat.

Blade: Very large (¾ by 3 to 1½ by 5 inches; average, 1⅛ by 4 inches; ratio of width to length, about 2:7). Shape ovate, ovate-elliptical, or elliptical. Base obtuse, bluntly acute, or bluntly round; origin of margins usually unsymmetrical. Apex acute and generally somewhat tapering on mature leaf. Margin crenate; crenations rather deep, moderately long; bristle broad, short. Midrib medium size, medium prominent, very light green in color. Veins distinct. Color of upper surface of blade dark green; lower surface light green.

Petiole: Rather short to medium (½ to 1¼ inches; ratio of length of petiole to length of blade, about 1:4), moderately stocky; medium rigid. Pale green on lower surface; light green on upper. Groove medium in depth and width. Glands two to six, commonly two to four; irregular shaped, commonly oval and protruding, medium in size, yellowish or grayish brown; often slightly stipulate near base of blade on petiole; two glands frequently on base of blade.

Bearing habit.—Inclined to bear alternately and irregularly. Averages a moderate crop in districts best suited to its culture; in other districts it averages light crops. Produces many gummy nuts. Bears on spurs, mostly on wood 2 to 3 years old; some spurs on laterals of the previous year. Frequently several nuts on a spur. Spurs long (¼ to ⅜ inch), medium in diameter (⅛ inch); small for size of nut; expands gradually to nearly round or very wide oval disk 3/16 inch in diameter. Buds free, plump, rather short, bluntly pointed; scales large, medium thick, medium tough, dark brown, considerable rather long pubescence on edges.

NUT

Immature nut.—Size large (1¾ by 1¼ by ⅞ to 2¼ by 1¼ by 1 inches). Shape long, irregular ovate, part on ventral side of axis ovate or oval, on dorsal side oblong oval. Ventral edge gradually and evenly curved, no ventral ridge; suture depression distinct, shallow. Dorsal edge quite straight, curved most at base and apex. Base rounding; ventral shoulder generally round and sloping, with suture line clear to disk; dorsal shoulder square; cavity very shallow (1/64 inch). Apex pointed; style drops quite early; rudiment small, pubescent.

Hull: Outer surface light green; frequently colored with dark-green spots; turns yellowish green when ripening; pubescence abundant, green, fine, short, gray. Inner surface pale gray, almost white, slowly turning brown as dehiscence continues. Usually dehisces on ventral edge first, but sometimes on dorsal; generally begins at middle of ventral edge, extending rapidly to base and apex; dorsal edge commonly cracks open part way or entire length, but not always; other cracks at apex common; hulls open at apex, ventral edges curl inward usually unequally. Date of dehiscence, August 5 to September 15.

Hulled nut.—(Pl. X, *E.*) Size variable, medium to large (1⅜ by ¾ by ½ to 2⅛ by 1⅛ by ¾ inches). Number of nuts to the pound, 130 to 230. Percentage of kernel to shell in hand-cracked samples, 55 to 62, depending upon the season; machine cracked, orchard run, 43.

Shape: Rather flat; long oval to oval-ovate (viewed edgewise, oval, sides frequently unsymmetrical). Axis one-fourth way from dorsal to ventral edge. Ventral edge moderately thin; much curved, usually most sharply curved at base and apex; wing thin, long, recurved at apex; flange thick at base; varies as to prominence; usually prominent, increasingly prominent from middle to apex; decreasing in prominence from middle to base; at base, wing generally only slightly elevated, although occasionally slightly prominent. Dorsal edge straight or only slightly curving; tendency to be flat rather than plump but varies much in this respect; dorsal ridge narrow to medium in width, medium prominent. Base rather thin, truncate or broadly round, at right angles to axis or slightly ventrally sloping; dorsal shoulder square; ventral shoulder sharply rounding; stem scar small to large oval, at right angles to axis or ventrally sloping; seldom sloping dorsally. Apex pointed, ending in long, sharp, thin wing; the recurving pointed wing and curved ventral edge give apex a scimitar shape.

Shell: Very soft; texture varies somewhat with season; outer shell of medium thickness, often soft and crumbly, frequently firm. If not harvested at the right time, outer shell adheres to hull to a considerable extent. Outer surface grayish brown or light brown. Pits medium to numerous in number; medium to large in size; variable in shape, mostly round; variable in depth. Short grooves on ventral edge and at base. Canals medium in size, round or oval. Fibers medium in size. Inner shell rather thin, hard, and tough, undulating dark-brown surface, much darker than outer surface of shell as a rule. Ventral streak medium to dark brown, usually narrow, short; base end acute to acuminate.

Kernel: Some doubles (14 to 17 per cent), size medium to large (1 by ½ by ¼ to 1¼ by ⅝ by 5/16 inches), usually do not completely fill shell. Shape rather flat, oval or ovate oval; edges have a tendency to be straight near middle. (When viewed edgewise shape is a long oval with rather straight sides.) Ventral edge a little shorter than dorsal and more curved, especially at apex. Base broadly round or slightly square; dorsal shoulder thin, round, or square; ventral shoulder round or sloping. Apex thin, broad, obtuse, with small sharp point. Pellicle medium to dark reddish brown in color, medium thick, rather tough, covered with pubescence which is very short at base and long and thick near apex; veining usually distinct at base; pellicle fold small to medium; stem scar dark brown, medium in size, wide oval in shape. The variety has a tendency to form gummy or defective kernels. Kernel wrinkles much in drying. Flavor slightly sweet, fairly good.

Distinguishing characteristics.—Nut very long, somewhat pointed at both ends; ventral edge curved most near base; wing prominent, being least prominent at base and most prominent at apex; dorsal ridge thin and prominent; ventral edge nearly straight in middle; stem scar sloping ventrally or at right angles to axis; dorsal shoulder square, ventral shoulder curved; apex ends in a distinctly long, thin, recurved point. Kernel rather large, long, flat, oval, or oval-ovate, edges inclined to be straight near middle, apex thin and broad with small point, dorsal shoulder frequently square, pellicle reddish brown, with very long, thick pubescence at apex decreasing until very short at base.

COMMENTS

This variety is especially valuable as a pollinizer of the Nonpareil. It has, however, many defects. It is fastidious as to soil and moisture requirements. It has many double kernels and many that are blank, gummy, or deformed (blanks and defectives 3 to 10 per cent, depending on season). The nut has a tendency to be shrunken or open or to be gummy at the apex. It was believed that the tree produced a larger proportion of gummy nuts when it bore a heavy crop than when the crop was light, but this has been shown not to be the case. It is known that the nuts gum worse when moisture is lacking, when sap circulation is disturbed for any reason, or when prolonged hot, dry winds occur during the early growth of the nuts. The variety bears better in some districts than in others. It appears to do better on the west side of the Sacramento Valley than on the east side. It does not do well in the

Oakley district. It is probable that proper irrigation, cultivation, and soil fertilization have a considerable effect upon the bearing of this variety. The Ne Plus Ultra nut has been a good seller and still is, but it is losing popularity with growers on account of its defects from a production standpoint. It is widely grown in every almond-growing section in California.

OTHER NE PLUS ULTRA TYPES

There are several types of nuts closely resembling this variety, probably seedlings, which come into the market as Ne Plus Ultra.

51. NEVERFAIL

Origin.—Because the Hatch varieties did not do well on his ranch, George W. Smith, of Brentwood, Calif., kept individual records of seedling trees for three years and budded those that bore well on other trees. One of the heaviest bearers he named the Neverfail. The Neverfail almond at present is grown to a limited extent in the Brentwood, Knightsen, and Oakley districts.

Description

TREE

Medium large, medium vigorous, rather upright (ratio of height of head to width, 1:1); lower branches droop somewhat.

Main branches.—Straight, medium in length and stockiness. Branches quite profusely. Branching angle acute. Wood somewhat brittle. Bark smooth, grayish brown, striations common on young bark.

Twigs.—Quite vigorous in growth, stocky, straight. Branching angle acute. Nodes rather large. Internodes rather long (½ to 1¾ inches). Bark thick, smooth, green, turning to brownish tinge near nodes in autumn.

Lenticels.—Numerous, size medium (on 6-year-old wood, $\frac{1}{32}$ by ⅛ inch), raised slightly; cracked longitudinally; brown; oval; apexes bluntly acute. Lenticels numerous on twigs, small, greenish gray.

Foliage.—Dense. Leaves medium in size, moderately numerous, fairly thick, tendency to curl up slightly toward midrib and to recurve at apex, edges wavy.

Blade: Medium in size (average, 1 by 3¼ inches; ratio of width to length, 1:3). Shape variable, mostly ovate-elliptical. Base obtuse; origin of margins slightly unsymmetrical; sometimes symmetrical. Margins deeply crenate; frequently serrate at apex. Color of upper surface smooth, glossy, bright, dark green; lower surface dull green. Midrib slender, very light in color. Veins distinct.

Petiole: Long (1 inch; average ratio of length of petiole to length of blade, about 1:3). Slender to stocky. Dark green on upper surface, pale green on lower, tinged with red in late fall. Groove deep and narrow. Glands one to three, generally two, globular, prominent, brownish yellow; on petiole near base of blade; sometimes on basal crenations of blade. Petiole has tendency to widen slightly next to blade.

Bearing habit.—Produces fair crop and is quite regular. Mostly on spurs on wood 2 to 4 years old; a few on laterals; nuts frequently in pairs. Some spurs compound, long (1 to 2 inches). Single spurs long (¼ to ⅜ inch); slender ($\frac{3}{32}$ to ⅛ inch); expand gradually to wide-oval disk ¼ by ¼+inch. Buds free, long, conical.

NUT

Immature nut.—Size small to medium (average, 1½ by 1¼ by 1 inches). Rather plump, short, wide oval or ovate oval; part on ventral side of axis oval or ovate; on dorsal side long oval or obovate. Ventral edge much curved; sloping at apex; smooth or with only a slight suggestion of ridge; suture depression moderately shallow ($\frac{1}{32}$ inch) and quite wide ($\frac{3}{32}$ inch). Dorsal edge gently curved, with tendency to have bulge or ridge at apex. Base bluntly round, usually corrugated, dorsally sloping; dorsal shoulder square, projecting ¼ inch from center of disk; ventral shoulder round; cavity $\frac{1}{32}$ inch deep. Apex plump, bluntly rounding; slightly depressed; style long and remains late; rudiment short and wide.

Hull: Outer surface green, turns gradually to reddish brown as it dehisces; pubescence short, coarse, gray, felty. Inner surface pale green, gradually turning reddish brown. Dehisces first on ventral edge; then frequently cracks on base or apex end of dorsal edge, or both; the hull frequently divides in halves; ventral edges curl inward. Ripens during late August and early September.

Hulled nut.—(Pl. XI, *A.*) Size small ($1\frac{1}{8}$ by $\frac{3}{4}$ by $\frac{9}{16}$ inches). Number of nuts to the pound, 250 to 300. Percentage of kernel to nut, 45.

Shape: Somewhat plump, ovate (edgewise view, ovate with tapering apex and frequently with unsymmetrical sides). Ventral edge much curved, plump, evenly curved; flange thick and tapering to medium thin edge; wing not prominent. Dorsal edge slightly curved, plump, dorsal ridge usually narrow and fairly prominent, being most prominent at base. Base plump; round or truncate; stem scar medium to large in size, depressed, oval, at right angles to axis or slightly sloping either ventrally or dorsally. Ventral shoulder round. Dorsal shoulder square or slightly rounding. Apex plump, pointed either bluntly or acutely; extreme tip with small mucronate point. Ventral edge of apex curving much; dorsal edge recurved slightly at extreme apex.

Shell: Soft; usually hard enough to render cracking with fingers difficult but possible; outer shell either hard or soft (average medium), ash gray to light brown. Pits medium to numerous in number, usually medium in depth; variable in shape, mostly round. Frequently depression along one or both sides of ventral edge. Ventral edge grooved. Base grooved and frequently corrugated. Canals medium to large, round or oval. Fibers usually small. Inner shell thin and tough. Inner surface medium to dark brown, darker than outer surface of shell, slightly undulating. Ventral streak dark brown, wide, medium in length, with wide rounding base.

Kernel: Size average medium ($\frac{13}{16}$ by $\frac{1}{2}$ by $\frac{5}{16}$ inch). Shape plump, short, wide, ovate. Ventral edge curving rather sharply. Dorsal edge gently curving and much longer than ventral. Base plump; dorsal shoulder square or widely rounding and thin at apex; ventral shoulder plump, sloping or sharply rounding. Apex pointed and mucronate at extreme tip. Viewed edgewise the apex is cuneiform with bulging sides; tapering to a thin point. Pellicle thin; medium light to medium reddish brown; veining usually distinct; pubescence very short and most abundant at apex, so short at base as to cause that portion to appear smooth; pellicle fold on apex half of ventral edge large; base scar small, dark brown; oval. Flavor rather flat, oily, slightly sweet.

Distinguishing characteristics.—In order to distinguish this nut it is well to read the entire description. It is not found outside of the Oakley district.

COMMENTS

This nut tends to run to small sizes. It is a second-rate nut and can not compete in the market with the better varieties, such, for example, as the Nonpareil and I. X. L.

52. NONPAREIL (EXTRA)

Origin.—Like the Ne Plus Ultra, this variety originated as a sprout from the root of a budded almond tree on the A. T. Hatch ranch, Suisun, Calif. Mr. Hatch soon regarded the nut as the best of the three Hatch varieties. It was known for a time under the name "Extra," but was finally called Nonpareil. (For a more complete history, see I. X. L.) It is strange that out of thousands of seedlings an almond originating as did the Nonpareil should prove itself to be the best of all almond varieties for California. It has been planted extensively in every almond-growing section of California; also to some extent in Oregon, Washington, Arizona, New Mexico, Utah, Idaho, Texas, and Australia.

Description

TREE

Moderately vigorous grower, spreading (ratio of height of head to width $1:1\frac{1}{4}$). Trunk medium stocky (about one-half as rapid in growth as California, Princess, and King), long, straight, with depressions and slight twist. Bark medium in thickness, cracks rather shallow, exfoliates in large flakes.

Main branches.—Medium long, rather stocky; grow straight or curved downward; outer branches drooping. Branching angle widely acute. Wood medium in texture, slightly brittle. Bark dark reddish brown or grayish red;

overlaid in places or sometimes entirely by thin gray epidermis; old bark cracks and exfoliates in large patches.

Twigs.—Medium in vigor, rather stocky. Wood medium brittle. Nodes medium size. Internodes medium in length ($\frac{1}{3}$ to $1\frac{1}{4}$ inches). Bark medium tough, light green; patches turning dark red in autumn; considerable waxy bloom.

Lenticels.—Vary in number from medium to quite numerous; size small to medium (on bark 10 to 12 years old, $\frac{1}{16}$ by $\frac{1}{8}$ to $\frac{3}{32}$ by $\frac{1}{2}$ inch; average, $\frac{3}{32}$ by $\frac{3}{8}$ inch; on bark 7 to 9 years old, average, $\frac{1}{16}$ by $\frac{1}{4}$ inch); much raised, rough and cracked, gray, large, wide, elliptical; apexes bluntly acute; extreme apexes on older lenticels acuminate; shape oval with gently curving sides, some diamond shaped; apexes usually widely acute. On young bark lenticels much raised. On twigs lenticels numerous, medium in size, roundish, gray green. (See Pl. XVII, *D.*)

Foliage.—Rather dense. Leaves on individual branches medium in number; rather large in size or when small borne in bunches on spurs; rather flat or slightly recurved. (See Pl. XXIV, *B.*)

Blade: Size average rather large ($\frac{5}{8}$ by $2\frac{1}{4}$ to $1\frac{5}{8}$ by $4\frac{1}{2}$ inches; average, $\frac{7}{8}$ by 3 inches). Width varies somewhat. (Ratio of width to length, about 2:7.) Shape of mature leaves nearly ovate, with gently tapering point for one-half to two-thirds the length of blade; immature leaves elliptical. Base obtuse; generally sharply curved at base; origin of margins symmetrical or unsymmetrical. Apex generally somewhat cuneiform. Margins crenate; crenations rather deep, short to medium in length; bristle short and dark. Color of upper surface of blade smooth, medium deep, glossy, dark dull green. Lower surface smooth, light dull green. Midrib heavy, prominent, pale green. Veins distinct, elevated on lower surface and sometimes very slightly on upper.

Petiole: Varies somewhat in length ($\frac{3}{4}$ to $1\frac{1}{8}$ inches); average long (1 inch); ratio of length of petiole to length of blade about 1:3; thick; rather rigid; pale green on under surface; upper surface light green tinged with red in autumn. Groove deep, rather wide. Glands commonly two or three, often four, sometimes five or more, rather small, round, or oval, greenish, yellowish, or grayish brown.

Bearing habit.—Quite regular; bears moderately heavy crops on spurs. Spurs moderately long ($\frac{1}{4}$ to $\frac{3}{8}$ inch); rather slender ($\frac{1}{8}$ inch) but variable; disk wide oval, about $\frac{3}{16}$ inch in diameter. Buds free, bluntly pointed, slightly constricted at base; scales reddish brown, medium in size, thin, tough, small amount of pubescence on edges.

NUT

Immature nut.—Quite large (average, $2\frac{1}{8}$ by $1\frac{5}{8}$ by $1\frac{1}{8}$ inches). Shape ovate. Ventral edge curves more than dorsal; ridged. Dorsal edge curved. Base bluntly round, usually sloping slightly ventrally. Apex bluntly round, wide; rudiment small, pubescent.

Hull: Outer surface light green; pubescence abundant, short, fine, velvety. Dehisces on ventral edge only, sometimes cracks a little at apex of dorsal edge; opens up well (fig. 14), usually pulling away portions of outer shell; generally many fibers show when dehiscence starts. They are almost white at first, later drying to light brown; edges curve inward. Date of dehiscence, August 1 to September 5.

Hulled nut.—(Pl. XI, *B.*) Size medium to quite large, variable, but rather uniform on same tree ($1\frac{1}{4}$ by $\frac{3}{4}$ by $\frac{1}{2}$ to $1\frac{1}{2}$ by $\frac{7}{8}$ by $\frac{1}{2}$ inches). Number of nuts to the pound, 200 to 270. Percentage of kernel to nut in hand-cracked samples, 65; in machine-cracked orchard run, 42.

Shape: Rather flat; ovate (edgewise view, oval or oval-ovate, narrowing at base and apex). Ventral edge rather thin, much curved, most sharply curved at base; wing very thin, very prominent. (Wing and portions of shell easily broken off in hulling.) Dorsal edge curved, but not nearly so much as ventral; usually thin; dorsal ridge narrow, usually quite prominent, especially at base. Base thin, obtusely pointed (only occasionally is base broadly rounded); stem scar small, narrow, sloping ventrally, or at right angles to axis; ventral shoulder sloping; dorsal shoulder square, projecting above stem scar. Apex pointed, but acuteness of apex varies much; wing usually ends in a small, thin, sharp, and slightly recurving point. Viewed edgewise nut tapers from the middle to the extreme apex, giving the apex a cuneiform appearance.

Shell: Paper; color variable, light to dark brown; outer shell thin, soft, brittle, crumbly, easily broken and chipped off in hulling and handling; frequently flaky in appearance. Pits numerous, varying in size, shape, and depth; present clear to the dorsal ridge; often obscured by flaky material or torn off with outer shell in hulling. Canals medium to large, oval. Fibers coarse. Shallow grooves run out on wing. Inner shell thin. Inner surface undulating, light to dark brown, frequently lighter in color than outer surface. Ventral streak medium to dark brown, long, narrow, usually depressed with a light-colored line along each side; base end peculiarly pointed, streak narrowing from middle to base, giving the base a long, acuminately pointed shape.

Kernel: Very seldom double (less than 4 per cent). Size medium to quite large (average, 1 by $\frac{5}{8}$ by $\frac{5}{16}$ inch). Rather thin, does not usually quite fill entire shell cavity. Very attractive in appearance. Shape oblong-ovate; both dorsal and ventral edges only slightly curved near middle. Ventral edge usually curved more at apex than dorsal; dorsal edge much longer than ventral. Base flat, usually round, ventral shoulder round and abruptly sloping from base scar; dorsal shoulder round with curved portion above base scar; apex wide, obtuse, but always with sharp mucronate tip. Pellicle light to dark brown, thin, tender, smooth; (the very smooth pellicle is distinctive of this variety); veining very distinct; pellicle fold small in size, on apex third of ventral edge; base scar medium in size, very dark brown, usually round. Flavor pleasant, sweet, fairly good.

Distinguishing characteristics.—A combination of the following characteristics is distinctive: Paper shell; flat, ovate shape of nut; base sloping ventrally or at right angles to axis, small stem scar. Kernel with smooth pellicle, veining distinct. Round base, often with square shoulder, wide apex ending in mucronate point.

The Nonpareil is sometimes confused with the California, King, Klondike, Silvershell, and Princess. It may be easily told from these by its more pointed base, sloping ventrally or at right angles to axis, and by the oblong-ovate shape of the kernel with rather straight sides. The pellicle of the Nonpareil is smoother than that of any other variety.

COMMENTS

Past experience and present indications go to show that the Nonpareil is the best of all varieties for California. As it is popular in the market, there is apparently no danger of overproduction of the variety. The kernel is attractive in appearance, has a smooth pellicle, and a sufficiently good flavor to be desired by the purchaser. Furthermore, the nut has a paper shell, produces a large percentage of kernels, cracks well, and has scarcely any doubles. It brings the highest price on the market of any of the California varieties. The variety is well adapted to every California almond-growing section except the Oakley district, where it has not borne well. The trees as a rule are remarkably even and satisfactory in bearing, except in seasons when frosts injure the blossoms. Although it does not yield as much in weight as some of the hard-shelled varieties (owing to its paper shell), the difference in price more than makes up for the lack of weight when averaged over a term of years. There is no doubt that in the future the price of almonds will be more largely based upon the percentage of kernel to shell than is the case at present. The Nonpareil should then bring a higher price in comparison with other varieties than it has in the past. It seems that in the absence of a better variety growers will do well to plant as many Nonpareil trees as possible. At least one-half the trees in the orchard should be Nonpareil, or better two-thirds, enough of other suitable varieties being planted to insure pollination. For the latter purpose Ne Plus Ultra has been a favorite where it does well. As the I. X. L. is intersterile with Nonpareil it can not be used for pollinating that variety. Other varieties which bloom at approximately the same period and which can be used to pollinate the Nonpareil are Lewelling, Jordan, Peerless, California, King, Klondike, Princess, Drake, and probably Eureka. While the latter variety has not been scientifically tested out as a pollinizer of the Nonpareil over a long period, observations to date indicate that it is adapted to that purpose.

The chief defect of the Nonpareil is that owing to its paper shell it is especially subject to the depredations of birds. For the same reason in many sections it has been infested recently by the peach worm. It is probable that spraying will have to be resorted to in order to keep down the pest.

OTHER TYPES OF NONPAREIL

A few types of Nonpareil almonds remarkable for size of nuts or yields have been noted. As yet it has not been ascertained whether they are really new types or whether they are the ordinary Nonpareil variety growing under specially favorable conditions.

53. O'NEIL

Origin.—Found among nursery stock purchased by C. C. Barr, Esparto, Calif., in 1894. Grown to a limited extent in the Esparto-Capay districts.

Description

TREE

Quite upright, but open (ratio of height of head to width, 1:1¼), rather vigorous grower. Trunk vigorous, stocky, quite straight; bark rough, exfoliating in large patches.

Main branches.—Medium in length, stocky, upright. Branching angle acute. Wood brittle. Bark dark reddish brown with thin, gray epidermis on young branches; old bark very rough, exfoliating in very thick patches.

Twigs.—Medium in length; very stocky. Wood brittle. Nodes small. Internodes medium in length (½ to 1 inch). Bark thick and rather tough; light green, turning reddish brown in patches in autumn.

Lenticels.—Medium in number and size (on bark 8 to 10 years old, 1/16 by 3/16 to 3/32 by ⅜ inch), raised, wide elliptical, apexes usually blunt. On young branches, raised, gray, rather conspicuous. On twigs, numerous, gray green, usually inconspicuous.

Foliage.—Of medium density. Leaves on individual branches, rather few, slightly twisted.

Blade: Size varies (⅝ by 2 to 1½ by 4 inches; average medium, ⅞ by 3 inches; ratio of width to length variable, average 2:7). Shape ovate. Base bluntly acute with rather straight sides; origin of margins symmetrical or slightly unsymmetrical. Apex long, tapering, with rather straight or incurving sides which at tip round off suddenly; an acute point is present at tip. Margins coarsely crenate; bristles short and wide. Midrib rather large and prominent. Veins distinct, frequently slightly elevated on lower surface.

Petiole: Usually stocky and short (average, ⅝ inch; ratio of length of petiole to length of blade, about 1:5). Light green, upper surface turning rusty red in late summer. Groove wide and shallow. Glands two to four, frequently none, very small, globular; sometimes basal crenations are slightly glandular.

Bearing habit.—Average crop light. Frequently blossoms are injured by frost; blooms a few days earlier than I. X. L. Bears on wood 1 to 6 years old. Spurs frequently compound, living one or two years; very large (sometimes ½ inch in diameter). Single spurs short to medium (3/16 to ¼ inch), medium in width (⅛ inch), expanding suddenly to wide oval disk 3/16 by ¼ inch. Some single spurs are really short twigs ½ to 1 inch long. Buds short, plump, conical, apex rather blunt; scales dark brown, small, thick, rather hard, with short, gray pubescence on edges.

Immature nut.—Size average medium (1½ by 1⅛ by 1 inches). Shape plump, ovate; part on ventral side of axis ovate; part on dorsal side oblong-ovate or oblong-oval. Ventral edge sharply and evenly curved; ventral ridge 1/16 inch high; ventral suture distinct, shallow. Dorsal edge gently curved at base and apex. Base plump, sloping dorsally, stem cavity shallow. Apex plump, bluntly pointed; style remains late; rudiment small.

Hull: Outer surface green, turning grayish yellow; pubescence very abundant, very long, rather coarse, gray, woolly. Inner surface rapidly turns reddish brown during dehiscence. Dehisces along ventral edge; dorsal edge cracks somewhat at apex and base; ventral edges curl inward. In dehiscing hulls remain attached to disk at base, but finally fall from tree before nut does. In knocking, hulls come loose easier than nuts, which are difficult to knock. Ripens August 15 to September 5.

Hulled nut.—(Pl. XI, *C*.) Size medium (1⅜ by 1 by 11/16 to 1½ by 1⅛ by ¾ inches). Number of nuts to the pound, 120 to 150. Percentage of kernel to nut in hand-cracked samples, 25.

Shape: Rather plump, wide, ovate (edgewise view, plump, ovate, sides frequently unsymmetrical). Ventral edge plump, curved, curving sharply at apex;

wing medium in thickness to thin, medium in prominence; generally two wide pronounced ridges on ventral edge running parallel to wing. Dorsal edge varies in curve, but always curved less than ventral edge; dorsal ridge narrow and prominent. Base plump, truncate, slightly sloping dorsally; stem scar very large, wide, oval, depressed, gently sloping dorsally. Apex rather plump, wide, bluntly rounding, with suggestion of mucronate tip; dorsal and ventral sides curve abruptly at apex; wing pronounced one-half inch from tip of apex, but gradually becomes less pronounced from that point until immediate apex is reached.

Shell: Hard, dark brown to reddish brown in color, with reddish tinge on dorsal edge and around stem scar; said to be very hard to bleach; outer shell thick, varies in texture from medium hard to somewhat spongy. Pits medium in number, size, and depth; mostly round. Wide groove on ventral edge. Two ridges each side of wing running parallel with wing. Short grooves at base of nut. Canals large and round, network medium to fine; fibers large. Inner shell rather thick, hard, and tough. Inner surface light to medium brown in color, usually lighter than outer surface; slightly undulating. Ventral streak medium to dark brown, medium in width, long, round pointed at base, but base half slightly tapering.

Kernel: Many doubles (20 per cent). Does not fill shell. Size, medium to quite large (average 1 by ½ by $\frac{5}{16}$ inch). Shape ovate, medium plump. Ventral edge slightly more curved than dorsal. Ventral shoulder round, plump, elevated. Dorsal shoulder somewhat square and sloping, thinner than ventral. Apex half of kernel tapering; apex bluntly acute with mucronate tip. Pellicle thick, tough, dark, reddish brown, thickly covered with exceedingly long, coarse pubescence; pellicle fold medium size on apex half of ventral edge; base scar small to medium, dark brown, smooth, round. Veining distinct but obscured by pubescence. Flavor slightly sweet, good.

Distinguishing characteristics.—Nut wide ovate; base truncate, dorsally sloping, stem scar large; apex blunt; shell, dark reddish brown, brightest color on ventral edge; ventral edge with pronounced ridges parallel to wing. Kernel ovate, dark reddish brown, exceedingly pubescent.

The O'Neil nut somewhat resembles in shape Barclay, Crown, Philopena, and Silvershell. The blunt apex and longitudinal ridges on the ventral edge of the O'Neil render it easy to distinguish from these four varieties.

COMMENTS

The main defects of this variety are the light-bearing habit, the dark-colored nut which is hard to bleach, the tenacity with which the nuts cling to the tree at harvest time, the hard shell, and the large quantity of double kernels. It is one of the inferior varieties of nuts and is not to be recommended. The variety is not found outside of the Esparto district.

54. PEERLESS

Origin.—In California; exact date and locality uncertain. It was grown at first most extensively in the Davis, Winters, and Woodland localities. By 1895 it was being sold by California nursery firms, and by 1910, commercial plantings of the variety had been made in all the almond-growing districts of California. Attempts have been made to grow the variety in Oregon and Washington and in Australia.

Description

TREE

Rather vigorous; spreading (ratio of height of head to width, 1:1¼), somewhat scraggly. Trunk rather stocky; bark medium rough, cracks close together and quite deep, exfoliates in small thick patches.

Main branches.—Medium in length, rather stocky, tend to grow upright, lower ones horizontal or drooping. Branching angle wide. Wood brittle. Bark somewhat rough on old branches; exfoliates in large flakes; yellowish brown to dark reddish brown; thin patches of gray epidermis; long, silver-colored, transverse patches common on young growth. Young branches frequently striated.

Twigs.—Moderately short as a rule, moderately stocky, rigid. Branching angle rather wide. Nodes medium in size. Internodes average short (½ inch). Bark medium light green; a little bloom; reddish patches in fall.

Lenticels.—Numerous, medium in size (on wood 8 to 10 years old, $\frac{1}{16}$ by $\frac{1}{4}$ to $\frac{3}{32}$ by $\frac{3}{8}$ inch), wide and short (often narrow on old bark); raised; gray, rough, elliptical; apexes acute or bluntly acute. On young branches lenticels frequently are rendered inconspicuous by gray epidermis. On twigs, lenticels small, numerous, grayish green, quite conspicuous.

Foliage.—Dense. Many leaves on spurs in clusters. Leaves tend to recurve and often to roll up along midrib.

Blade: Medium to large ($\frac{5}{8}$ by $2\frac{1}{2}$ to $1\frac{1}{8}$ by $4\frac{1}{4}$ inches; average $\frac{7}{8}$ by $3\frac{1}{4}$ inches; ratio of width to length, about 1:4). Shape long ovate. Base bluntly round or wide-acute; origin of sides symmetrical or slightly unsymmetrical. Apex long, tapering, acute, sides with tendency to curve inward along apex half of blade. Margins irregularly crenate; crenations medium in depth; bristles very short. Midrib medium in size and prominence, pale green. Veins distinct, the larger ones elevated on under surface of blade. Upper surface medium deep green; lower, dull light green.

Petiole: Stocky; length variable, usually short to medium (average $\frac{3}{4}$ inch; ratio of length of petiole to length of blade, about 1:4). Upper surface light green, tinged with red in late summer. Under surface light green. Groove, rather narrow and deep. Glands two to six, mostly two or three, rather small, globular, oval, or slightly stipulate, dark yellowish brown; one basal crenation of blade often glandular.

Bearing habit.—Varies much with seasons. The variety is very susceptible to frost injury when in the bud, possibly because the stigma projects beyond the petals when the buds swell previous to opening. As the shell is very thick, the crop in a good season is heavy, and sometimes bumper crops are produced. In other seasons and in frosty localities the crops are light. Average production is light. Bears mostly on spurs on wood 2 to 4 years old; bears some on last year's laterals. Spurs medium in length ($\frac{1}{4}$ inch) and diameter ($\frac{1}{8}$ inch); expands suddenly into wide oval disk $\frac{1}{4}$ by $\frac{1}{4}$ inch. Buds free, large, long, plump, usually compressed laterally; scales large, rather thick, tough, brown, with gray pubescence on edges.

Immature nut.—Vary in size, medium to quite large (average, $1\frac{1}{2}$ by $1\frac{1}{4}$ by 1 inches). Shape wide oval or oblong-oval. Ventral edge curved slightly more than dorsal; ventral suture distinct, $\frac{1}{64}$ inch deep. Base broad, plump, truncate at right angles to axis; stem cavity shallow ($\frac{1}{32}$ inch). Apex broad, round, plump; frequently flat or depressed; style frequently adheres late; rudiment short and thick.

Hull: Outer surface green, turning yellowish brown while dehiscing; pubescence abundant, medium in length and coarseness, gray, felty. Inner surface green, turning brown rapidly while dehiscing. Dehisces along ventral suture (fig. 11); cracks slightly on dorsal edge at base and apex, but only occasionally does entire dorsal edge crack. Short cracks at base common. Ventral edges curl inward, one side usually drying faster than the other. Ripens August 10 to September 10.

Hulled nut.—(Pl. XI, *D.*) Size variable, but uniform on same tree; small in dry years and when trees bear heavy crop. Average, medium to large ($1\frac{1}{8}$ by $\frac{7}{8}$ by $\frac{11}{16}$ to $1\frac{3}{4}$ by $1\frac{1}{8}$ by $\frac{3}{4}$ inches). Number of nuts to the pound, 100 to 150. Percentage of kernel to nut in hand-cracked samples, 35; in machine-cracked orchard run, 32.

Shape: Very distinctive; wide ovate; ventral and dorsal edges usually curve about the same, bringing the axis near the middle (viewed edgewise, plump, ovate, frequently with unsymmetrical sides). Ventral edge curved sharply at shoulder, gradually increasing in curve from middle to apex; wing thick, lacking in prominence; ventral flange lacking in prominence to medium prominent and thick. Dorsal edge has tendency to be straightest near middle, curves abruptly at apex, usually curving inward near immediate tip, producing a small characteristic bump or shoulder on apex. Base quite plump, broad, truncate at right angles to axis or sloping very slightly ventrally; dorsal shoulder rather square with tendency to be thinner than ventral shoulder and slightly elevated; ventral shoulder sharply rounding; stem scar medium in size, long oval in shape, slightly depressed. Apex broad, obtuse, frequently with mucronate tip. Viewed edgewise the apex tapers from middle of nut to tip.

Shell: Hard, but varies much; outer shell thick, smooth, usually hard, but sometimes brittle or soft. Pits variable in number, few to numerous; vary in size even on same nut, some always large and deep; variable in shape. Dorsal edge and even dorsal ridge pitted. Ventral edge grooved, the grooves on base half having a tendency to run parallel with wing. Short grooves near base. Canals very large. Fibers very large and tough. Inner shell thick, hard, brittle, or tough. Inner surface medium brown in color, usually darker than outer surface, frequently mottled or streaked with fine lines of darker brown; somewhat longitudinally ridged. Ventral streak dark brown, long, medium to wide, bluntly pointed or round at base. Apex bluntly pointed.

Kernel: Many doubles (38 per cent); size medium to quite large (average 1 by ⅝ by ¼ inch). Many gummy nuts. Seldom fill shell entirely. Shape thin oval or ovate-oval; quite wide in proportion to length. (Viewed edgewise, long ovate with sides flat and straight and apex plump.) Ventral edge much shorter than dorsal. Base rounding; ventral shoulder rounding; dorsal shoulder rounding or occasionally very slightly square, with a tendency to be plump; apex wide but tapering and plump. Pellicle light to dark brown, medium to thick, and quite tough; pubescence varies, most at apex and along pellicle fold, coarse; pellicle fold medium to pronounced in size, extending along apex half of ventral edge; veining distinct; base scar large, dark brown, oval. Flavor flat and neutral, but sweeter after nut is stored for a time.

Distinguishing characteristics.—Nut distinguished by its shape and clean, smooth appearance of the outer shell. Dorsal edge curves sharply; apex broad and blunt with a characteristic hump on dorsal edge; base truncate; shell hard, light in color; ventral streak with blunt apex and base; double kernels common.

COMMENTS

The Peerless nut, with its light-colored, clean, smooth shell, is attractive in appearance and finds a ready market as a second-rate nut. It has, however, a thick hard shell and a kernel of rather poor quality. Although the nuts knock easily and hull easily, they are difficult to harvest because, when ripening, they drop from the trees so easily that winds may scatter them, making it necessary to harvest them very early or to pick them from the ground, an expensive and annoying process. One of the greatest defects of the variety is its susceptibility to frost injury during blooming time. Slight frosts which do not injure other varieties blooming at the same time often damage the Peerless blossoms greatly. The variety has been planted to a considerable extent as a pollinizer of the Nonpareil. The Peerless almond is grown commercially in every almond-growing district in California. In further plantings the frostiness of the district should be taken into account very carefully.

55. PHILOPENA (GURR PHILOPENA)

Origin.—Uncertain. Probably originated near Merced, Calif. Grown in various localities in the Sacramento and San Joaquin Valleys, Calif. Is much less common now than formerly. This nut is sometimes erroneously called the "Queen."

Description

TREE

Moderately upright (average height of head to width, 1:1.1). Rather rapid grower. Trunk moderately stocky with rough bark.

Main branches.—Moderately stocky, moderate in growth. Branching angle medium. Bark rough on old branches and grayish. On young branches bark reddish brown with much grayish epidermis; exfoliates in medium-sized flakes.

Twigs.—Rather stocky, medium in growth. Nodes rather large. Internodes short to medium (½ to 1½ inches). Bark light green as a rule, tinged with red in fall.

Lenticels.—Numerous; variable in size (on 10-year-old bark, 1/16 by ¼ to 1/16 by ½ inch), elliptical, with rather blunt apexes; raised; brownish gray.

Foliage.—Usually dense. Leaves large and flat.

Blade: Varies much in size; averages large (1⅛ by 4 inches). Shape ovate, ovate-elliptical, or elliptical with sides rather straight in middle. Young leaves are usually wide-elliptical. Base bluntly rounding; origin of margins commonly unsymmetrical. Apex bluntly acute, seldom cuneiform. Margins very widely and shallowly crenate; basal pair of crenations often glandular; bristle short and wide. Main rib slender, depressed on upper surface, especially near base. Veins distinct. Upper surface rather light green, lower lighter than upper.

Petiole: Long ($1\frac{1}{4}$ to $1\frac{1}{2}$ inches; ratio of length of petiole to length of blade averages 1:3–); slender, especially near blade. Groove wide and shallow. Glands one to eight, often four to six, small oval, greenish gray; basal pair often slightly stipulate.

Bearing habit.—Mostly on spurs on wood 2 to 4 years old; occasionally on terminal growths. Spurs medium in length ($\frac{1}{4}$ inch); rather stocky ($\frac{1}{8}$ inch); expand gradually to wide oval disk $\frac{3}{16}$ by $\frac{1}{4}$ inch. Spurs usually numerous. Buds long, somewhat pointed, plump at base; scales moderately thick, tough, reddish brown, with short pubescence.

Immature nut.—Medium (average about $1\frac{3}{4}$ by $1\frac{1}{4}$ by $1\frac{1}{8}$ inches). Shape plump ovate. Ventral edge curved more than dorsal; no marked ridge. Dorsal edge considerably curved. Base plump, round, dorsally sloping. Apex somewhat tapering and pointed. Style usually drops early. Rudiment small, pubescent.

Hull: Outer surface deep bright green; pubescence abundant, fine, rather short, felty. Inner surface changes rapidly from light green to brown when dehiscing. Dehisces first on ventral edge and often later on dorsal edge; cracks in hull near base common.

Hulled nut.—(Pl. XI, *E.*) Size rather large (average, $1\frac{3}{8}$ by $1\frac{1}{8}$ by $\frac{7}{8}$ inches). Number of nuts to the pound, 90 to 120. Percentage of kernel to nut in hand-cracked samples, 45.

Shape: Plump; wide, pointed ovate (viewed edgewise, ovate, usually with unsymmetrical sides and tapering apex). Ventral edge very plump, sharply curved at base, curved to quite straight in middle, tendency to straighten at point, giving the apex pointed appearance; wing thin to thick, medium in prominence, in some cases being most prominent near apex, but generally most prominent near base. Dorsal edge very plump, much curved, usually curved most at apex; dorsal ridge medium to wide, indefinite to prominent in elevation. Base very plump, round or truncate, sloping dorsally, only occasionally at right angles to axis; ventral shoulder rounding to slightly square; dorsal shoulder rounding to sloping; stem scar medium to large, round, or oval, depressed. Apex tapering from near base, sharpness of point varies, immediate apex plump or thin. Frequently with sharp point. (Sides bulging to incurving when viewed edgewise.)

Shell: Usually just within the soft-shell class; can be cracked with fingers; outer shell medium in thickness; varies from soft and crumbly to hard and firm. Color dark brown. Pits medium to large on same nut; vary in shape but mostly round. Surface between pits smooth or finely stippled. Grooved at base and along ventral edge. Dorsal ridge pitted or grooved with very short grooves. Canals medium in size, fine network of medium-sized fibers. Some spongy material between outer and inner shell. Inner shell of medium thickness, hard and brittle. Inner surface medium to dark brown, darker than outer. Ventral streak very dark brown with irregular margins; long; very wide, tapering from middle to base.

Kernel: Very large proportion of doubles (65 to 75 per cent). Size medium to large (average 1 by $\frac{5}{8}$ by $\frac{3}{8}$ inch). In some types of Philopenas one kernel develops at the expense of the other, producing a single deformed kernel or kernel with crease in side. Kernels usually fill shell cavity well. Shape of single kernels plump, cuneiform-ovate. Ventral side much shorter than dorsal when measured from apex to base scar. Dorsal shoulder square and sloping and thinner than the ventral shoulder. Ventral shoulder sloping. Apex two-thirds of nut tapering. Pellicle light to dark brown, thick, very pubescent; pellicle fold small, base scar dark brown, usually round. Flavor pleasantly sweet and nutty.

Distinguishing characteristics.—Nut large, plump, ovate; base usually sloping dorsally; apex tapering; dorsal edge much curved, dorsal ridge pitted or grooved; ventral edge and base with short, coarse grooves; pits large and deep; ventral streak dark brown, tapering from middle to base. Kernels mostly doubles, flavor sweet and nutty, pellicle pubescent.

In shape this nut resembles Barclay, Crown, O'Neil, and Silvershell. The pink edge of the Barclay and the scimitar-shaped apex of the Crown are sufficient to prevent confusion with the Philopena. The Philopena is easily distinguished from the O'Neil by the dark reddish colored shell, rather blunt apex, and pronounced ridges on the ventral edge parallel with the wing on the latter. The Philopena is so much larger than the Silvershell and has so many more doubles that the two varieties are easily distinguished.

COMMENTS

The Philopena is not a desirable nut for market. It should not be grown except in a very limited way for home use.

56. PISTACHE

Origin.—An old French variety which was introduced into the Eastern States about 1840. On account of its very small size, the nut never became popular in California. Only a few trees of the variety now exist in the United States.

Description

TREE

The tree is easily recognized by its upright growth and numerous short lateral branches and twigs.

NUT

Hulled nut.—(Pl. XII, *A.*) Very small (average, $\frac{7}{8}$ by $\frac{11}{16}$ by $\frac{5}{8}$ inch). Number of nuts to the pound, 220 to 280. Percentage of kernel to nut in hand-cracked samples, 40 to 60.

Shape: Very plump, short, round-ovoid; nut nearly as thick as wide (viewed edgewise, bulging and often unsymmetrical). Ventral edge very plump, much curved, frequently depressed on one side of wing. Wing medium to thick, moderately prominent throughout entire ventral edge. Two ridges parallel to wing common. Dorsal edge very plump, much curved throughout entire length. (Axis through middle of nut.) Dorsal ridge medium in width and only slightly elevated. Dorsal and ventral edges of the same length. Base very round, plump, dorsally sloping; ventral shoulder sharply rounding; dorsal shoulder sloping. Stem scar large, round, sharply dorsally sloping. Apex plump, wide, and rounded or broadly tapering with small point, sides nearly equal in curve.

Shell: Soft, rather thin, light brown; outer shell usually hard and smooth, occasionally spongy; inner shell thin and hard. Pits small, numerous, shallow, round or long oval in shape. Short grooves on ventral edge. Fibers medium to large, and network rather coarse for size of nut. Inner shell thin and hard. Surface of inner shell light brown in color. Ventral streak dark brown, medium to long, wide, with blunt base.

Kernel: Doubles frequent. Kernel plump and small ($\frac{3}{4}$ by $\frac{1}{2}$ by $\frac{3}{8}$ inch), filling shell cavity well; distinctly ovoid in shape. Dorsal and ventral edges practically equal in curve and length; axis through middle of kernel. Base plump and round, both shoulders plump and round. Apex broadly tapering. Pellicle thin, cinnamon brown in color, exceedingly pubescent; pellicle fold small but distinct, base scar in middle of base (i. e., shoulders equal in plumpness and curve); dark brown, large, round. Flavor good, pleasant, sweet.

Distinguishing characteristics.—The Pistache is probably the smallest nut grown in our country. It is easy to identify by the following: Small size, plump, wide ovoid shape; base broad, round, plump, and dorsally sloping; axis passes through middle of nut; dorsal and ventral edges much curved; apex broad, plump, blunt; kernel plump, ovoid, dorsal and ventral shoulders of equal plumpness, pellicle very pubescent.

In shape this nut is in the group including Ballard, Drake, Languedoc, Lewelling, Spagon, and Texas. It is distinguished from all of these, except Spagon, by its small size. The Spagon nut is smaller and more pointed at the apex than the Pistache; furthermore, the Spagon nut is not grown in this country; the few trees in California supposed to be of this variety were grafted over.

COMMENTS

The Pistache variety is of no value commercially on account of the very small size of the nut.

57. PRINCESS

Origin.—A French variety introduced into the United States at an early date. William R. Prince & Co., of Flushing, L. I., N. Y., listed trees of the variety for sale in 1847. It was offered for sale by the Fruitland Nurseries, of Augusta, Ga., in 1880. Although Princess almond trees were planted in California as early as 1853 and sold by Felix Gillet, of Nevada City, in 1876, it appears that the variety was not offered in California nursery catalogues until first listed by Mr. Gillet in his catalogue of 1880. Most of the commercial plantings of Princess almonds in California were made prior to 1895. Since that date nearly all of the Princess trees have been removed or grafted over to other varieties. At the present time the variety is grown only to a limited extent, but Princess trees are found here and there throughout the State. Attempts were made to grow the variety in the Middle Atlantic States and even in New England. It was also planted in Florida, Mississippi, Georgia, Louisiana, Texas, and Missouri.

Description

TREE

Large, very vigorous, rather upright grower with spreading top (ratio of height of head to width, 1:1¼). Trunk very vigorous, very stocky, somewhat twisted, with many long deep depressions; bark very rough, cracks wide apart, exfoliates in thin flakes.

Main branches.—Long, stocky, rather upright, frequently gently curved or wavy. Branching angle moderately acute. Branches profusely. Large branches with twisted grain and many flat depressions. Wood brittle with many knots. Bark dark reddish brown, with much silver gray or yellowish epidermis; exfoliates in thin flakes; old bark rough (resembling black oak in this respect).

Twigs.—Quite numerous, long, straight, and slender, giving the tree a feathery appearance when leafing out in spring. Branching angle acute. Wood brittle. Nodes large. Internodes short (¼ to 1¼ inches; average, ½ inch). Bark thick, smooth, light green, turning reddish in fall.

Lenticels.—Numerous, large (on bark 8 to 10 years old, 1/16 by 3/16 to 3/32 by ⅝ inch; average, 1/16 by 7/16 inch); slightly raised, cracked through middle longitudinally, ash gray, oval; sides near middle straight and parallel, curving quite sharply at ends which are bluntly acute; extreme apexes acute to acuminate. Lenticels small and numerous on twigs and young growth. (See Pl. XVI, *E.*)

Foliage.—Medium in density. Leaves flat or slightly recurved. (See Pl. XXIV, *A.*)

Blade: Variable in size, small to large (¾ by 2½ to 1½ by 4½ inches; average, about medium, ⅝ by 3¼ inches; average ratio of width to length, about 1:5). Shape generally ovate with tapering apex, some elliptical, occasionally obovate; vary much in width, average narrow. Base obtuse, bluntly rounding; origin of margins usually slightly unsymmetrical. Apex acute, apex one-third of leaf usually tapering. Margins curving much in middle, sometimes bulging; irregularly crenate, crenations short and deep; bristles rather long, dark. Upper surface of blade glossy, light, medium green; lower surface shiny, dull green, lighter than upper. Midrib medium slender, prominent. Veins distinct.

Petiole: Short to medium (½ to 1 inch; average 1 inch; ratio of length of petiole to length of blade, about 1:4); stocky, rather inflexible; light green, very slightly tinged with red in autumn. Groove rather wide and deep. Glands two to eight; basal crenations often glandular; when glands on petiole are over two they are seldom opposite; large, wide oval, dark brown to dark gray; glands nearest the base of leaf usually the smallest.

Bearing habit.—In California the variety is a light bearer. Nuts borne largely in clusters (some in pairs) on spurs on wood 2 to 4 years old, some on 5-year-old wood, some on last year's laterals. Spurs short (⅛ to ¼ inch); diameter medium (⅛ inch); expands suddenly to wide oval disk. Buds large, long, plump, constricted at base, apex tapering; scales reddish brown, thin, with short, gray pubescence on edges.

NUT

Immature nut.—Average size, rather small to medium (1⅜ by 1¼ by 1 inches). Shape somewhat globular; edgewise view oblong. Ventral edge much curved, ridged, usually with a depression parallel to suture. Dorsal edge curved less than ventral. Base round, blunt, much sloping dorsally; stem cavity quite deep. Apex blunt; style drops early.

Hull: Outer surface green; pubescence abundant, short, silky. Inner surface very light in color, remaining so until hull is thoroughly dried, when it becomes light brown. Dehisces on ventral edge; base and apex of dorsal edge often crack; frequently cracks appear on sides of hull at base and apex. Portions of outer shell generally adhere to hull. Ripens August 5 to September 15.

Hulled nut.—(Pl. XII, *B.*) Size rather small to medium (average, $1\frac{1}{4}$ by $\frac{3}{4}$ by $\frac{9}{16}$ inches). Number of nuts to the pound, 250 to 300. Percentage of kernel to shell in hand-cracked samples, 60 to 70.

Shape: Rather flat, ovate; part of nut on wing side of axis cordate (edgewise view, ovate or oval-ovate, with sides frequently unsymmetrical). Ventral edge much curved, curving most sharply at base; wing thin to medium in thickness, prominent throughout entire length of ventral edge. Dorsal edge curved and more plump than ventral, curved most near tip; dorsal ridge narrow. Base rounding to round pointed; dorsally sloping; ventral shoulder rounding and usually elevated above the stem scar; dorsal shoulder slopes abruptly from edge of stem scar; stem scar medium to large, long oval in shape, depressed, sharply dorsally sloping. Apex broad to medium pointed, tapering from one-third of way from base to tip of nut; wing ends in tip at apex, prominent near apex.

Shell: Paper shell, light to dark grayish brown in color; adheres to hull badly, thin flaky gray substance frequently present; so thin that in hulling it is frequently broken, especially along ventral edge. Network of fibers fine, delicate, and close to outer surface. Inner shell very thin. Inner surface usually light brown in color; undulating. Ventral streak generally rather narrow, but sometimes of medium width, usually long, base blunt; frequently streak widens from middle to base, i. e., base usually as wide as any other part of streak and sometimes wider.

Kernel: A few doubles (2 to 4 per cent). Size medium (average, 1 by $\frac{5}{8}$ by $\frac{7}{16}$ inch). A considerable number of imperfect kernels (10 to 20 per cent). Shape wide ovate; rather plump at base. Dorsal edge much longer than ventral; usually sharply curving. Ventral edge gently curving, more plump than dorsal edge. Dorsal shoulder round, or square and sloping, and straight, with a sharp turn or hump well down on dorsal side below base scar or on level with it. Ventral shoulder slopes rather abruptly from base scar. Apex tapering and broadly pointed with dorsal edge more curving than ventral at extreme apex. Pellicle light to dark brown; veining distinct; pubescence very short, giving kernel smooth appearance. (Some seedling types closely resembling Princess are thickly covered with pubescence of medium length.) Pellicle fold small, but extending one-half to two-thirds the length of the ventral side; base scar medium size, usually round. Flavor good, pleasant, sweet.

Distinguishing characteristics.—The Princess nut is occasionally confused with the Nonpareil and often with the California, King, Klondike, and Silvershell. (See distinguishing characteristics of California, King, and Klondike for points of difference between them and this variety.)

The Princess differs from the Nonpareil as follows: Its base scar slopes dorsally, while in the Nonpareil the base scar slopes ventrally or is at right angles to the axis. The base of the nut is less tapering in Princess, the base of the ventral streak more blunt, the kernel shorter, the apex of the kernel more cuneiform, the dorsal shoulder of the kernel more humped, and the pellicle less smooth than in Nonpareil.

The shape of the Princess nut and kernel is much like the Silvershell. In the Silvershell the shell is much harder and the apex of the nut more tapering than in the Princess. The outer surface of the shell has deep and distinct pits in the Silvershell, while in the Princess the outer shell is flaky.

COMMENTS

It is to be regretted that the Princess almond, with its excellent kernel, has defects which render its production unprofitable. It is a shy bearer. In dry seasons the nuts are hard to hull. They cling to the trees so tightly that it is expensive to harvest them. The nuts are also frequently injured by birds and are susceptible to injury from the peach worm. Growers have replaced the Princess with the Nonpareil and other more productive varieties. Although the variety still enters the market commercially from California, most of the Princess almonds retailed in the East are imported. Two types of almonds, probably seedlings of the Princess, resemble it in many respects, but are much inferior in quality. They do not enter the market to any considerable extent.

58. PROCTOR

Origin.—In California, exact date and place of origin in question. Grown to a very limited extent in the Sacramento Valley.

Description

Hulled nut.—(Pl. XII, *C.*) Size rather large ($1\frac{1}{2}$ by $1\frac{1}{4}$ by $\frac{7}{8}$ inches). Number of nuts to the pound, 140 to 160.

Shape: Uniform in proportion to length, width, and thickness, but vary much in shape of base, apex, ventral and dorsal edges. Ovate to ovate-oval. Nut flat to medium plump (viewed edgewise, nut is ovate or oval-ovate, frequently with unsymmetrical sides). Ventral edge sharply curved at ventral shoulder, the curve of edge varying; wing varies from thin to thick, usually very prominent, especially at apex; less prominent at base than in middle. Dorsal edge quite curved, but curve varies. Dorsal ridge narrow to medium in width and medium to very prominent. Base varies much; either plump or constricted, truncate or round; stem scar at right angles to the axis or slightly sloping either ventrally or dorsally; ventral shoulder round; dorsal shoulder usually slopes rather suddenly from stem scar. Apex varies much in shape; may be thin or plump, acuminate or obtuse, but wing is very prominent at apex; stem scar small to medium, long oval in shape.

Shell soft but varies in hardness; outer shell light to dark brown; thick and usually soft and crumbly, but varies in this respect; always some spongy material between outer and inner shell. Pits variable in size and shape, deep, numerous, present on the entire dorsal edge as well as sides. Base and ventral edge grooved. Canals large. Fibers coarse. Inner shell hard, brittle, and of medium thickness. Inner surface of shell light to dark brown in color, undulating. Ventral streak medium to dark brown, usually long, narrow to medium in width, tapering from middle to apex and base, base acute.

Kernel: Many doubles. Size large ($1\frac{1}{8}$ by $\frac{11}{16}$ by $\frac{1}{4}$ inches). Flat, wide ovate, resembles the I. X. L. kernel somewhat in shape. Dorsal and ventral edges equal in curve. Base usually round, sometimes somewhat truncate, seldom sloping; dorsal shoulder thinner than ventral, with slight tendency to be square. Ventral shoulder slopes abruptly from base scar. Apex flat and wide, seldom cuneiform, except in edgewise view. Pellicle medium to dark brown; medium tough; pubescence rather thick; veining distinct; pellicle fold small; base scar small, oval, light to dark brown, usually of the same color as rest of pellicle. Kernel seldom fills entire shell cavity. Flavor slightly sweet, only fair.

Distinguishing characteristics.—On account of variations in this nut it is well to use the entire description in distinguishing it.

COMMENTS

A coarse, inferior nut which should be eliminated from commercial orchards.

59. PROVENCE

Origin.—This almond, sometimes erroneously called "Eureka," "Soft-Shell Jordan," or "Jordan," was introduced from France by Felix Gillet, of Nevada City, Calif. It was quite widely distributed in the Sacramento Valley, California, and at one time a considerable proportion of the almonds of the Jordan type shipped from the State consisted of the Provence. At the present time only a few trees of this variety remain.

Description

TREE

Vigorous, upright (ratio of height of head to width, 1:1). Trunk stocky, irregular in growth; bark rough, cracks deep and close together, exfoliates in thick, small patches.

Main branches.—Medium long, medium slender; upright, tending to crook outward. Branching angle sharply acute. Wood quite tough, with many long, twisted, depressed patches. Bark dark maroon brown, overlaid with thick gray epidermis; striated on young branches.

Twigs.—Medium in length, slender, flexible. Branching angle sharply acute. Wood tough. Nodes medium in size. Internodes medium in length (½ to 1 inch). Bark medium thick, rather tough; glossy light green, with some bloom and with reddish brown patches in autumn.

Lenticels.—Very numerous, somewhat variable in size and length, usually large (average on bark 8 to 10 years old, $\frac{3}{32}$ by $\frac{5}{16}$ to $\frac{3}{32}$ by ½ inch); much raised; light gray; wide; apexes bluntly acute. On young growth lenticels small, usually conspicuous.

Foliage.—Medium in density. Leaves medium in number, tend to curve up along midrib. Many borne in clusters on spurs.

Blade: Size varies much (⅝ by 2⅛ to 1¾ by 4+ inches, average medium, ⅞ by 3⅜ inches; ratio of width to length, about 1:4). Shape ovate or elliptical-ovate, seldom obovate. Base usually acute; origin of sides symmetrical or nearly so. Apex bluntly acute to narrowly obtuse, with sides curving gently outward. Margins somewhat irregularly crenate; crenations wide and short. Upper surface of blade light green, glossy, with some bloom. Under surface slightly lighter than upper. Midrib rather slender, slightly depressed on upper surface, prominent on lower surface. Veins distinct, elevated on lower surface, frequently depressed slightly on upper.

Petiole: Medium in length to rather long (average, 1 inch; ratio of length of petiole to length of blade, 2:7); slender; pale green on under surface; light green on upper, slightly tinged with red in autumn. Groove narrow and deep. Glands two to six, rather large, prominent, slightly elevated, globular, or roundish.

Bearing habit.—Produces light average crops, but bears much better than Jordan. Nuts borne on spurs, mostly on wood 2 to 4 years old, some on old wood, nuts generally in clusters, sometimes in pairs, and when in pairs occasionally united at the base. Spurs medium in length to rather short (¼ inch or less); diameter large ($\frac{3}{16}$ to ¼ inch); expands gradually to round or wide elliptical disk $\frac{3}{16}$ by ¼ inch in diameter. Buds free, large, long, tapering, slightly compressed, slightly constricted at base; scales large, medium thick, hard, tough, dark brown, with small amount of medium short pubescence on edges.

NUT

Immature nut.—Size medium to large (average, 2 by 1¾ by 1 inches). Shape elliptical, with straight dorsal edge. Ventral edge smooth or with slight ridge. Ventral suture depression distinct, extending a short distance beyond apex.

Hull: Outer surface light green; pubescence abundant, gray, velvety; style drops early. Dehisces on ventral edge only; ventral edges spread wide apart and as drying proceeds curl inward (one side frequently rolls faster than the other). Ripens August 5 to 30.

Hulled nut.—(Pl. XII, *D.*) Size medium to quite large (average, 1⅝ by 1 by ¾ inches). Number of nuts to the pound, 130 to 160. Percentage of kernel to shell in hand-cracked samples, 32.

Shape: Elliptical, pointed somewhat at both ends, medium plump (viewed edgewise, elliptical or ovate-elliptical, narrowing at base, rather plump at apex). Ventral edge gradually and evenly curved, but bulging; i. e., widest portion in middle; frequently has two ridges or wide depressions parallel with wing; wing medium width, lacks prominence; flange thick, not prominent. Dorsal edge quite straight, plump; dorsal ridge narrow and frequently prominent. Base constricted and pointed, rather thin; stem scar very small, round or oval, at right angles to axis or slightly sloping dorsally. Apex bluntly rounded, plump.

Shell in the hard-shell class, but many of them can be broken with the fingers. Pits rather few, medium to small in size, irregular in shape, rather shallow. Grooves on ventral edge and at base. Canals and fibers medium size, rather numerous. Some spongy material between outer and inner shell. Color of outer shell light to dark brown. Outer shell of medium thickness. Inner shell quite thick, hard. Inner surface undulating, medium light brown. Ventral streak dark or light brown, medium in length, usually wide, base pointed, apex rather blunt (not as acute as in many). Grooves on ventral edge and at base.

Kernel: Size medium to quite large (1 by ½ by ¼ inches). Shape ovate or oval, flat. Ventral edge curved more than dorsal as a rule. Dorsal edge thinner and longer than ventral. Dorsal shoulder with tendency to be square, frequently above ventral shoulder, which is round and sloping. Pellicle very pubescent, dark brown; heavy pellicle fold on apex one-third of ventral edge; base scar, dark, small, round, or oval. Flavor sweet, but dry and inferior to Jordan.

COMMENTS

The nuts and kernels of this variety resemble those of the Rock Jordan in appearance. The kernel, however, is much inferior to the Jordan in quality. Until recently, the Provence almonds have been bought and sold by some dealers as Jordans. It is probably due to this fact, at least in part, that the Jordan almond from California has been thought by eastern confectioners to be inferior to the imported Jordan. The Provence has a very heavy shell, and as other nuts of the hard-shelled type yield much better, the Provence is no longer extensively grown.

60. QUEEN

Origin.—Uncertain. Now grown principally near Woodland, Calif., where it is thought to have originated, and in the Arbuckle district. A few trees are found elsewhere in the Sacramento Valley.

Description

TREE

Medium vigorous, moderately upright. Trunk medium in diameter, bark rough.

Main branches.—Medium long, medium stocky. Branching angle rather wide. Bark reddish brown, with gray epidermis.

Twigs.—Medium in length and stockiness. Nodes large. Internodes average short.

Lenticels.—Numerous, moderately large (average size on 8 to 10 year-old bark, $\frac{1}{32}$ by $\frac{3}{8}$ inch), narrow oval, pointed at apexes, slightly elevated, gray.

Foliage.—Varies considerable in density, according to variation in branching. Leaves on individual branches numerous, large.

Blade: Rather large to medium (average, $\frac{7}{8}$ by $3\frac{1}{8}$ inches; ratio of width to length, about 2:7). Shape oval or oval-ovate. Base obtuse; origin of margins unsymmetrical. Apex acute. Margins usually shortly and deeply serrate, sometimes crenate. Upper surface smooth, light green; lower light green. Veins distinct on lower surface.

Petiole: Length medium to rather long (average, $\frac{7}{8}$ inch; ratio of length of petiole to length of blade, about 2:7); rather slender. Groove quite wide and deep. Glands two to six, commonly four, grayish yellow, medium in size, globular or pointed.

Bearing habit.—Average light crops. Size of nuts varies much. Bears on spurs on wood 2 to 4 years old, mostly on wood 2 and 3 years old. Spurs medium in length ($\frac{1}{4}$ inch), medium to thick in diameter ($\frac{1}{8}$ to $\frac{3}{16}$ inch); expands gradually to wide oval disk $\frac{1}{4}$ by $\frac{1}{4}$+ inch.

NUT

Immature nut.—Size varies much in different seasons, averages large (about $2\frac{1}{4}$ by $1\frac{3}{8}$ by 1 inches). Shape oval or oval-ovate; part to ventral side of axis oval or oval-ovate; part to dorsal side long oval. (Edgewise view irregular oval.) Ventral edge much curved, curved most near middle; ventral ridge very pronounced ($\frac{1}{4}$ inch high, $\frac{5}{16}$ to $\frac{3}{8}$ inch wide); grooves pronounced and deep each side of ridge. Suture line distinct, very narrow, shallow; varies as to part of ridge it occupies (i. e., straight down middle, near one side, diagonal, or crooked). Dorsal edge slightly curved (tendency to be quite straight), slightly ridged. Base rather thin, square, slightly dorsally sloping, much grooved and scalloped; ventral shoulder square; dorsal shoulder sloping; cavity $\frac{3}{8}$ inch wide and $\frac{1}{16}$ inch deep. Apex rather thin, wide, bluntly rounding, slightly depressed; style drops quite early, but varies; rudiment short, pubescent.

Hull: Outer surface green, with reddish patches late in season, especially on ventral edges and apex; pubescence medium in amount, coarse, short, gray. Dehisces along ventral edge first; later cracks on base or apex on dorsal edge;

frequently entire dorsal edge cracks, leaving the halves of the hull attached to each other at apex; ventral edges frequently pink at first; ventral edges curl inward near middle; all the rest of the cracked surface tends to spread outward, giving the hull a twisted appearance. Ripens August 15 to September 10.

Hulled nut.—(Pl. XII, *E.*) Size varies much, exceedingly small in dry seasons and very large in wet seasons. In normal seasons size average large (1½ by 1⅛ by ⅝ inches). Number of nuts to the pound, 85 to 200. Percentage of kernel to nut in hand-cracked samples, 28.

Shape: Somewhat variable; flat to plump; part on ventral side of axis ovate (edgewise view ovate or ovate-oval; tapering at base and apex). Ventral edge usually rather thin; curve varies, but always much curved; wing medium to thick, prominent throughout entire length of ventral edge; usually very prominent from middle to near apex; ventral edge has wide crease, outside of which are two coarse ridges running parallel to the wing the entire length. Dorsal edge straight or with very slight curve, tendency to curve at the apex, straight at the base; dorsal ridge narrow and prominent, especially at dorsal shoulder. Base constricted when viewed edgewise, wing prominent on ventral shoulder clear to stem scar; dorsal shoulder very square and thin, but does not project much from edge of stem scar; stem scar long, narrow, depressed; slightly but distinctly dorsally sloping, very seldom at right angles to axis. Apex broadly pointed and quite thin, with prominent, much-curved wing, although at the extreme tip the wing is less prominent than elsewhere; dorsal edge curves in at immediate apex; ventral edge curves from middle to apex.

Shell: Hard; both inner and outer shell thick and hard. Pits numerous, rather large, mostly round, deep; small round pits and short marks on ventral edge. Base creased and grooved, frequently the smaller grooves are bunched in large corrugations. Wide, pronounced depression runs along the ventral edge from the base scar to the extreme apex; along the outside of each depression is a heavy, prominent ridge. Wing grooved with coarse short grooves. Texture of shell between deep pits usually hard and bony, with round marks somewhat smaller in size than deep pits. Color of the outer shell light to medium brown. A little spongy material between the outer and inner shell. Canals large, rather few in number, round or oval. Fibers very large, network coarse. Inner surface corrugated or undulated; light to medium brown; usually with a light straw-colored streak bordering the ventral streak on each side. Ventral streak dark brown, wide, long, apex acuminate, tapering from middle to base, making the base end a long, tapering, acute point.

Kernels: Practically all double. Size average large (1⅛ by ⅝ by ⅜ inches). Pellicle thin, usually cinnamon brown in color, covered with fine pubescence. Flavor pleasant, slightly nutty and sweet, excellent.

Distinguishing characteristics.—Easily identified. Ventral edge much curved, wing prominent, usually very prominent from middle to near apex, less prominent at extreme apex than elsewhere, wide depression and prominent ridges throughout entire length of ventral edge, short, oblique, coarse grooves on flange; dorsal edge rather thin; dorsal ridge prominent, curved short at apex, straight at base; axis very near to dorsal edge; base slightly constricted, grooved and corrugated, stem scar long and narrow, sloping slightly dorsally or at right angles to the axis; kernels nearly all doubles, covered with fine pubescence.

COMMENTS

The tree varies much in production and size of nuts. When there is abundant moisture present in the soil the nuts will be exceedingly large and almost all the kernels double. In periods of drought the nuts will be small and many of the kernels single. Sometimes in exceedingly dry seasons the nuts may not average as much as one-half inch in length. The size of the nuts seem to be more affected by moisture supply than is the case in other varieties. Although the kernel has an excellent flavor, the large proportion of doubles, somewhat heavy shell, variation in size of nuts, and erratic bearing habit of the variety are against it. It should not be planted commercially.

61. REAMS (REAMS' FAVORITE)

Origin.—At some time prior to 1906, J. W. Reams, near Suisun, Calif., set out some almond trees which proved to be mixed lot. One of these trees, a thrifty grower and good yielder, was named "Reams' Favorite." The variety was sold by a few nursery companies in California by 1910 and was planted principally in the Sacramento Valley.

Description

TREE

Only moderately vigorous, spreading (ratio of height of head to width, $1:1\frac{1}{4}$), scraggly. Trunk moderately stocky, quite straight; bark has rather shallow cracks, exfoliates in flakes.

Main branches.—Medium in number; medium length; rather stocky; tendency to grow horizontal. Branching angle very wide, almost right angle. Wood rather tough. Bark smooth except for knots; dark reddish brown with patches of gray epidermis, frequently striated on young branches; exfoliates in small flakes.

Twigs.—Medium in length, quite stocky, rigid. Branching angle wide (very nearly a right angle). Nodes rather large. Internodes medium in length ($\frac{3}{8}$ to $1\frac{1}{8}$ inches). Bark rather thick and brittle, green with reddish patches in fall, usually coated with waxy bloom.

Lenticels.—Numerous; large (on bark 8 to 10 years old, $\frac{3}{32}$ by $\frac{3}{8}$ to $\frac{1}{4}$ by $\frac{7}{8}$ inch); raised, but surface of lenticel itself is smoother than in many other varieties; gray, frequently bark surrounding lenticels has light gray color; shape wide oval. On old bark sides tend to be straight and apexes acuminate. On young bark lenticels rather large, numerous, raised, greenish gray, wide oval, with bluntly acute to acuminate apexes.

Foliage.—Quite dense, although tree frequently is open in center. Leaves quite flat and moderately numerous on individual branches.

Blade: Small to medium ($\frac{3}{4}$ by $2\frac{1}{2}$ to $1\frac{1}{8}$ by $3\frac{1}{2}$ inches; average, $\frac{7}{8}$ by $2\frac{3}{4}$ inches). Wide (ratio of width to length, about 1:3). Shape ovate, tapering from middle of blade to tip. Base obtuse; origin of margins symmetrical or nearly so. Apex sharply acute, frequently margins curve inward near tip. Margins crenate; crenations of medium length and depth; bristle long, slender. Upper surface of blade glossy, bright medium green; lower surface lighter than upper. Midrib large and prominent, pale green.

Petiole: Quite long (average, $\frac{7}{8}$ inch; ratio of length of petiole to blade, about 1:3); vary much in thickness, inclined to be stocky and rather inflexible. Lower surface pale green. Upper surface light green, tinged with red in autumn. Groove narrow to medium, depth medium. Glands two to four, very small, yellowish brown, globular or oval.

Bearing habit.—Irregular bearer; averages heavy; bears exceedingly heavy crops in some seasons. Nuts borne principally on spurs on wood 2 to 4 years old, frequently in pairs and in clusters; a few borne on laterals. Spurs long ($\frac{3}{8}$ inch), medium in thickness ($\frac{1}{8}$ inch); gradually expand to almost round or slightly elliptical disk $\frac{3}{16}$ inch in diameter. Buds free, long, tapering, bulging at base; scales dark brown, large, thin, brittle, with considerable pubescence on edges.

NUT

Immature nut.—Size small to medium ($1\frac{1}{2}$ by $1\frac{1}{4}$ by $\frac{3}{4}$ inches). Shape oblong-ovate or oval. Ventral edge usually curves more than dorsal; varies as to ridge, often grooved on one side, sometimes on two, but both grooves seldom run entire length of edge; suture depression distinct; narrow, pubescent. Dorsal edge ridged, especially at apex and base. Base quite plump, grooved, round (shoulders lack prominence); slope nearly at right angles to axis, occasionally slightly sloping dorsally or ventrally; stem cavity very narrow and shallow ($\frac{1}{32}$ inch). Apex rather thin, broad, slightly depressed; style falls rather early; rudiment very small; pubescent in depression.

Hull: Outer surface irregular with shallow ventral depression and grooves; green, turning yellowish green to brown upon dehiscing; pubescence abundant, short, coarse, gray, felty. Inner surface light gray with green showing through as it starts to dehisce, later turning brown. Dehisces on ventral edge and usually partially or wholly on dorsal edge as well. Dorsal edge cracks either from base downward or from apex upward, the former being the most common; cracks frequently appear on sides. Ripens September 10 to October 10.

Hulled nut.—(Pl. XIII, *A*.) Size small to medium ($1\frac{1}{8}$ by $\frac{7}{8}$ by $\frac{11}{16}$ to $1\frac{1}{2}$ by $1\frac{1}{16}$ by $\frac{11}{16}$ inches; average, $1\frac{3}{8}$ by 1 by $\frac{11}{16}$ inches). Number of nuts to the pound, 130 to 150. Percentage of kernel to shell in hand-cracked samples, 47.

Shape: Wide-ovate or oval; varies much in thickness. Ventral edge plump, curved, nearly circular; varies somewhat in curve, usually curves more at apex and base than in middle. Usually broad, shallow longitudinal depression on one side of wing, especially near apex, with elevated ridge outside of depression. Outer shell joins wing at considerable angle, making the flange bluntly wedge shaped in cross section. Flange thick. Wing medium prominent to prominent, tendency to recede near base, most prominent near apex. Dorsal edge much curved, curved most near apex; dorsal ridge narrow and prominent. Base has tendency to be flat; wide and broadly rounded; dorsal shoulder drops off suddenly a short distance from stem scar; ventral shoulder rounded; stem scar rather small, wide oval, slightly depressed; at nearly right angles to axis or sloping slightly, either ventrally or dorsally. Apex broad and widely pointed to round; dorsal and ventral edges curve much at apex, the ventral edge curving the more.

Shell: Varies somewhat in texture; averages soft, frequently hard enough to render cracking with fingers impossible. Outer shell medium thick, varying from spongy to quite hard. Outer surface yellowish brown. Pits numerous, small, mostly round, present on the dorsal edge, even on the dorsal ridge. Some pits on ventral flange. Short oblique grooves of varying depth present on ventral edge, as well as short, fine, shallow grooves at base. Dorsal ridge marked with very short grooves. Canals medium in number and size, wide oval. Network of fibers rather small. Fibers average small. Inner shell medium in thickness and hard. Inner surface medium dark brown, undulated, or shortly corrugated. Ventral streak light brown, short to long, narrow to medium in width, tapering from middle to apex and from middle to base; base acuminate.

Kernel: Medium size to quite large (average, 1 by $\frac{5}{8}$ by $\frac{3}{8}$ inch); some doubles (14 per cent). Shape somewhat variable, rather flat, short, wide-ovate or oblong-oval; ventral edge usually curving more than dorsal. Base round; dorsal shoulder with tendency to be slightly sloping. Apex thin, round, usually slightly tapering. Pellicle light brown, thin, quite tough, thickly covered with short, coarse pubescence; veins distinct to indistinct; pellicle fold rather small on apex third or apex half of ventral edge; base scar small to large, round or oval, indistinct to prominent. Frequently single kernels have depression in one side, due to tendency to form doubles. Flavor slightly sweet, fair.

Distinguishing characteristics.—This nut is easily identified by its shape, character of outer shell, and the numerous small pits (see description).

COMMENTS

This variety, which is grown commercially in the Sacramento Valley, is not as widely planted as the Routier, to which it is superior. It bears heavily on the average, although it is somewhat irregular. The main bad points of this variety are its late-ripening habit, the unattractive shell, and quite a number of double kernels. On the whole, the variety is so far inferior to the better kinds, as the I. X. L. and Nonpareil, that it should not be planted.

62. RICE (RICE'S SOFT SHELL, RICE'S SEEDLING)

Origin.—Grown at one time to a limited extent near Newcastle, Calif. It was distributed from there to various parts of the Sacramento and San Joaquin Valleys, where a few of the trees of the variety still exist.

Description

Hulled nut.—(Pl. XIII, *B*.) Size small to medium (average, $1\frac{1}{8}$ by $\frac{7}{8}$ by $\frac{5}{8}$ inches).

Shape: Ovoid, with sharply tapering and pointed apex. Ventral edge much curved, being less curved at apex than elsewhere; wing very thin, medium prominent. Dorsal edge plump, gently curved, slightly recurved at apex. Base plump, round; dorsal shoulder drops off suddenly; ventral shoulder plump, round, slightly sloping; stem scar small, narrow, oval, at right angles to axis or slightly sloping either ventrally or dorsally. Apex tapering and sharp pointed; extreme apex acute, ending in projection of wing. Apex somewhat scimitar shaped.

Shell: Very soft, light gray or yellow brown; outer shell thin and crumbly. Pits numerous, large, round, deep. Surface between pits stippled. Canals few in number, medium in size. Fibers medium in size. Inner shell very thin, hard, brittle; medium light brown on inner surface. Ventral streak dark brown, medium length, usually wide, base end bluntly tapering.

Kernel: Small to medium (average, ⅞ by ½ by ⅜ inch). Many doubles; ovoid; both dorsal and ventral edges slightly curving. Base sloping; ventral shoulder sloping; dorsal shoulder rounded. Apex slightly tapering. Pellicle thin, reddish brown, smooth appearing, having a little very short, fine pubescence. Flavor very slightly sweet; fair.

Distinguishing characteristics.—This variety is no longer common. According to shape the nut falls into the class including the Brown, Cartagena, Concord, Fairoaks, Golden State, Routier, and various unnamed California seedlings. The nut of the Rice is easily distinguished by the long, pointed, scimitar-shaped apex, plump base, soft shell, and the marked reddish tinge to the pellicle.

COMMENTS

This variety is of little value. The nuts are too small and there are too many doubles among them. Only a few trees are grown at the present time.

63. RIO BONITO

Origin.—Unknown; perhaps originated near Niles, Calif. Only a few trees remain.

Description

Hulled nut.—Size rather small to medium (average, 1¼ by ¾ by ⅝ inches).

Shape: Rather plump; tapering-ovate (viewed edgewise, ovate with long tapering apex). Ventral edge gently curved near middle; curved suddenly near base and quite sharply at apex; wing medium in width and medium prominent throughout entire length of ventral edge. Dorsal edge slightly curved, tending to recurve somewhat at apex. Base plump, round; stem scar small, nearly round, slightly sloping dorsally. Apex bluntly tapering; ventral edge gently curving, dorsal edge recurving slightly at extreme apex.

Shell: Paper, dark brown or dark grayish brown; outer shell with small bumps or elevations, very soft, thin, and flaky, usually adhering to hull. Pits small, shallow, few in number. Inner shell exceedingly thin and brittle. Inner surface dark brown and smooth. Ventral streak dark brown, long, wide; blunt and wide at base end.

Kernel: Size, medium to quite large (1 by ⅝ by ⅜ inch). Ovate, tapering from base to apex with dorsal and ventral edges slightly curved. Base wide and quite plump, ventral shoulder rounded; dorsal shoulder somewhat square and sloping. Apex rather flat and somewhat cuneiform. Pellicle dark brown with very thick, coarse pubescence; veins indistinct; pellicle fold small on apex half of ventral edge; base scar dark brown, usually round, rather large. Flavor flat, poor.

Distinguishing characteristics.—The Rio Bonito is easily distinguished from other varieties by the shape of the nut (see description).

COMMENTS

Although the Rio Bonito has a paper shell which is well filled by the kernel, the inferior quality of the kernel is against it. The variety is said to be an erratic bearer. It is not a commercial variety at the present time, there being only a few trees in existence.

64. RIO VIRGIN

Origin.—Unknown; grown at one time to a limited extent in southern Utah.

Description

Hulled nut.—Size medium (1⅜ by 1 by ¾ inches).

Shape: Oblong oval. Ventral edge gently curved with very thick and very prominent flange and wing. Dorsal edge very slightly curved, almost straight.

Base wide, truncate, at right angles to axis or sloping slightly dorsally. Apex very wide and truncate.

Shell: Dark brown; very thick and hard. Pits very small, very numerous, shallow. Short grooves on ventral edge and base. Base somewhat corrugated; canals few and large, fibers coarse. Inner surface of shell light brown. Ventral streak medium brown, short, rather narrow with blunt base.

Kernel: Size medium to quite large (average, 1 by ½ by 5/16 inch). Shape long, oblong-oval, flat. Dorsal edge quite straight. Ventral edge curved, curving most at apex. Base thin and round. Pellicle dark reddish brown, tough and very pubescent. Flavor poor, quality very inferior.

Distinguishing characteristics.—Easily distinguished from other varieties by the oblong shape of nut, hard shell, truncate base and apex, very thick and very prominent wing, and shallow, very numerous, and very small pits.

COMMENTS

A hard-shelled almond of mediocre quality, having no value or commercial importance.

65. ROUTIER (ROUTIER'S LANGUEDOC, ROUTIER'S PROLIFIC)

Origin.—A variety derived supposedly from a seedling grown on the Routier ranch, Mills, Calif. It has been widely planted and is still produced commercially in the Sacramento, Davis, Winters, Woodland, Esparto, Chico, Suisun, Yuba City, Lodi, Oakdale, and Oakley districts.

Description

TREE

Only moderately vigorous. Somewhat upright (ratio of height of head to width, 1:1), but outer branches tend to droop. Very scraggly in growth. Trunk below average in stockiness, tends to be straight; bark rough with cracks very close together, exfoliates in thick small patches.

Main branches.—Rather stocky, very slow growing in length; lack vigor. Branching angle quite wide. Bark rough on old wood, exfoliates in small thick flakes, cracks close together. Under bark reddish brown, covered with much gray epidermis; silvery patches common. Striations frequent on young branches.

Twigs.—Produced in profusion, quite stocky, very short, make especially poor growth on old trees. Branching angle moderately wide. Bark dark green, grayish in autumn. Internodes very short (seldom over ¾ inch).

Lenticels.—Numerous, raised, variable in size, narrow and long, elliptical on old bark (average, 1/16 by ¾ inch), with pointed apexes; on young bark, rather long (average, 1/16 by ⅛ inch) with blunt apexes, and very numerous.

Foliage.—Moderately dense. Leaves large, flat, glossy.

Blade: Large and rather long (average 1⅛ by 4 inches), somewhat variable; elliptical; thick; flat; glossy. Base moderately acute; origin of margins slightly unsymmetrical. Apex moderately acute. Margin widely and irregularly crenate. Midrib depressed slightly on upper surface. Veins distinct. Color of upper surface deep bright green, turning yellowish green early in fall, lower surface slightly lighter than upper.

Petiole: Rather short (about 1 inch; ratio of length of petiole to length of blade, 1:4); stocky; often twisted slightly; tinged with bright red early in fall. Groove wide and shallow. Glands two to eight, often four, globular or wide oval, grayish green, reddish late in season. Basal gland occasionally slightly stipulate.

Bearing habit.—Bears regularly on spurs on wood 2 to 8 years old. Spurs medium in length (¼ inch), medium in thickness (⅛ inch); expand gradually to wide oval or nearly round disk about ¼ inch in diameter. Buds often in clusters, long, pointed, plump at base; scales thin, brittle, some short gray pubescence on edges.

Immature nut.—Size averages medium (2 by 1½ by 1 inches). Shape moderately plump, wide ovate. Ventral edge quite sharply curved; no well-marked ridge. Dorsal edge gently curved, curving most at apex. Base moderately plump, slightly dorsally sloping as a rule, occasionally ventrally sloping, and frequently at right angles to axis. Apex fairly plump, bluntly pointed. Rudiment small.

Hull: Outer surface dark green, later turning yellowish; pubescence abundant, gray, woolly, medium in length. Dehisces slowly, usually on ventral edge, cracks at apex common. Edges of hull generally roll outward at base. Ripens during September.

Hulled nut.—(Pl. XIII, *D.*) Size medium to rather large (1¼ by ¾ by ½ to 1¾ by 1 by ¾ inches; average, 1½ by ⅞ by ⅝ inches). Number of nuts to the pound, 160 to 250. Varies much in size according to season. Percentage of kernel to nut in hand-cracked samples, 36; in machine-cracked orchard run, 23.

Shape: Medium in length, oval or ovate, axis slightly nearer dorsal edge than ventral. Ventral edge slightly curved; prominence of flange and wing varies, averaging medium; wing most prominent near middle, least prominent near apex. Dorsal edge curved considerably, but less than ventral edge; dorsal ridge varies as to prominence. Base sharply rounded; stem scar large to medium in size; at right angles to axis or sloping slightly either ventrally or dorsally; dorsal shoulder drops off rather suddenly; ventral shoulder sharply rounding. Apex pointed or sharply rounding; ventral and dorsal edges gently curved, frequently sharply curved.

Shell very dark brown; varies much in hardness, soft to hard, averages soft; outer shell quite thick; varies in texture from crumbly and brittle to hard and flinty, generally hard. Pits medium in number; variable in size, shape, and depth; extend over dorsal edge. Portion of surface between pits stippled. Grooves on ventral edge nearly parallel to wing. Short grooves at base. Canals numerous, large, round, or wide oval. Network of fibers medium fine. Fibers rather coarse. Inner shell thin, hard, with dark-brown undulating inner surface. Ventral streak very dark brown, medium in length to long, medium in width, with somewhat tapering base end; point of base end bluntly acute.

Kernel: Medium thick; size medium (average 1⅛ by $\frac{9}{16}$ by ⅜ inches). Few doubles (6 per cent). Shape oblong oval. Ventral edge curved the entire length. Dorsal edge rather straight and thin. Base flat and rounded. Apex blunt. Pellicle medium to dark brown, tough, pubescence moderate, coarse; pellicle fold small, extending along apex half of ventral edge; veins frequently indistinct; base scar small, inconspicuous, oval. Flavor flat, poor.

Distinguishing characteristics.—On account of slight variations in this variety a reading of the entire description is advisable in attempting to distinguish the nut from other almonds. On account of its shape, the Routier is classed in a group containing the Brown, Cartagena, Concord, Fairoaks, Golden State, Rice, and several unnamed California seedlings. For points of difference between it and those varieties, see "Distinguishing characteristics" under the respective varieties.

COMMENTS

Although the Routier is a heavy bearer as a rule and is widely grown, the quality is so poor that it should be eliminated from commercial plantings as rapidly as possible. Many Routier trees are being grafted over to better varieties.

66. SELLERS

Origin.—Originated prior to 1890 by George Sellers, Oakley, Calif. The Sellers almond has not been widely advertised and was never planted very extensively. At the present time only a small number of trees are grown in California, the largest plantings being in the Davis, Winters, and Oakley districts.

Description

TREE

Vigorous, spreading (ratio of height of head to width, 1:1¼). Trunk stocky, vigorous, short; bark moderately rough with cracks close together, exfoliates in medium-sized flakes.

Main branches.—Vigorous, long, somewhat slender. Branching angle widely acute. Wood very tough with many knots. Bark smooth, dark reddish yellow brown with thin gray epidermis; exfoliates in small flakes; on young branches striations are common.

Twigs.—Very numerous, giving outer part of tree a feathery appearance, medium in length, rather slender, somewhat flexible. Branching angle wide.

Wood tough. Nodes small. Internodes medium in length (½ to 1¼ inches). Bark tough, bright light green, upper side turning brownish or reddish in fall.

Lenticels.—Scant to medium in number, average below medium; size large but vary much (on bark 8 to 10 years old, 1/16 by 5/16 to 3/32 by ¾ inch; average, 3/32 by ½ inch); shape, oblong-elliptical with acute ends; extreme apexes frequently shortly acuminate; gray, raised, usually rather smooth with line through center longitudinally. On young bark lenticels quite large, but frequently rendered inconspicuous by gray epidermis.

Foliage.—Below average density on individual branches, which are feathery in appearance due to numerous small twigs. Leaves curl and twist slightly.

Blade: Size variable, small to large (½ by 2 to 1¾ by 4¼ inches; average medium, ¾ by 3 inches); narrow and long when mature (ratio of width to length, about 1:4), but some very short, wide leaves are always present; elliptical or ovate, sometimes obovate. (Base rather acute, origin of margins slightly unsymmetrical.) Apex widely acute, extreme tip frequently shortly acuminate. Margins rather coarsely crenate; sometimes serrate; basal crenations or serrations sometimes much larger and longer than others. Upper surface of blade bright light green, appearing slightly yellowish in bright light. Under surface lighter than upper. Midrib rather small, prominent. Veins distinct.

Petiole: Somewhat variable in length, average medium for size of blade (¾ inch; ratio of length of petiole to length of blade, about 1:4); average slender, fairly rigid. Groove wide and deep. Glands two to eight, generally four or more. Lower crenations on blade frequently glandular, yellowish brown, medium size, globular or oval.

Bearing habit.—Averages fair crops. Bears on spurs mostly on wood 2 to 4 years old. Nuts often borne in pairs. Some compound spurs. Spurs long (¼ to ⅜ inch), medium in diameter (⅛ inch); expand suddenly to quite large and nearly round disk 3/16 to ¼ inch in diameter. Buds usually free, but sometimes slightly appraised, long, narrow, tapering; scales reddish brown, very thin, with small amount of short pubescence on edges.

Immature nut.—Size averages medium (1⅞ by 1 by ⅞ inches). Shape plump, long-oval (part to ventral side of axis long elliptical, part to dorsal side long-oblong). (Edgewise view long-oval or long-ovate.) Ventral edge gently curved; sloping at base and apex; ventral ridge absent or only slightly suggested; ventral suture very shallow (1/64 inch) and narrow (1/16 inch). Dorsal edge nearly straight, sometimes ridged at shoulder. Base pointed, lightly grooved; cavity narrow (¼ inch), shallow (1/32 inch). Apex pointed, round; suture deeper at apex than elsewhere; style drops early; rudiment small.

Hull: Outer surface green, retaining color well through dehiscence, finally turning yellowish green; pubescence abundant, medium in coarseness, rather short, gray, woolly. Inner surface green as dehiscence starts, turning gradually to dark brown, frequently with gray patches. Dehisces first on ventral edge, then as a rule from apex upward on dorsal edge; frequently ventral or oblique cracks appear on sides of hull near apex; the halves remain remarkably flat for some time, finally curling inward at apexes and along ventral edges. Nuts are somewhat difficult to harvest, as they hang rather tenaciously to twigs. Ripens August 5 to September 10.

Hulled nut.—(Pl. XIII, *E.*) Size medium to quite large (averages 1½ by 13/16 by ⅝ inches). Number of nuts to the pound, 140 to 190. Percentage of kernel to shell in hand-cracked samples, 58.

Shape: Rather plump; long ovoid, with bluntly pointed base and apex. Ventral edge very plump, gently curved in middle, curve increasing toward base and apex; flange rather thick, tapering bluntly to sharp edge; flange and wing medium in prominence, less prominent at extreme apex than elsewhere; wing thin. Dorsal edge gently curved, thick, plump; dorsal ridge wide but not prominent; dorsal suture frequently distinct. Base slightly constricted in all directions, tapering; dorsal shoulder drops off suddenly from edge of stem scar. Stem scar small to medium in size, round or wide oval, at right angles to axis or slightly sloping either ventrally or dorsally. Apex usually plump but tapering and bluntly pointed; dorsal edge curves sharply at apex; curve of ventral edge increases gradually from middle to extreme apex.

Shell: Color varies from light grayish brown to very dark brown, usually rather dark brown; soft, can be cracked with the fingers; outer shell spongy and soft. Pits numerous, small to medium in size, rather shallow. Surface of shell between pits finely stippled. Fine grooves on ventral edge and base. Canals large oval, medium in number. Network of fibers coarse. Fibers large.

Inner shell hard but thin; surface dark brown, covered with short deep undulations. Ventral streak very dark brown, short, wide, with wide blunt base end.

Kernel: Size medium to large (average, 1 by $\frac{1}{2}$ by $\frac{5}{16}$ inch). Many double kernels (50 per cent). Single kernels medium in size (1 by $\frac{1}{2}$ by $\frac{5}{16}$ inch). Shape flat, long oblong-oval. Ventral edge curved the entire length and about the same in length as the dorsal, more curved at base and apex than in middle. Dorsal edge straight in middle, curving considerably at base and apex for short distance, but not so much curved at these parts as ventral edge. Base round; dorsal shoulder thin, sharply rounding and gently curved; ventral shoulder slightly curved. Apex curved sharply from middle of ventral edge to tip of apex. Dorsal edge curved sharply for a short distance at apex. Pellicle dark brown, thin, medium tough; veins distinct or indistinct, covered with very short, coarse pubescence; pellicle fold on apex third of ventral edge small; base scar dark brown, small to large, wide oval. Flavor slightly sweet; rather inferior.

Distinguishing characteristics.—The shape of this nut places it in the group containing the California Jordan, Eureka, Favorite, Gilt Edge, and Sellers. (See these varieties for points of difference.)

COMMENTS

This nut has a large percentage of kernel to shell, but a large percentage of the kernels are doubles. Blooms late, about the same time as Texas and Languedoc (March 5 to March 30). It is rather hard to harvest. The variety has little to recommend it.

67. SILVERSHELL

Origin.—A California seedling variety, originated about 1890. The exact locality of origin is not certain. Most of the orchards of the variety were planted from 1893 to 1900. The Silvershell is no longer popular. At the present time most trees of the variety are found near Woodland, Yolo, and Davis, Calif.

Description

TREE

A small, weak grower, spreading (ratio of height of head to width, 1:1$\frac{1}{4}$), scraggly; rather open, something like Lewelling in shape. Trunk small, weak grower, short; bark rough with cracks close together, exfoliates in small flakes.

Main branches.—Short, rather stocky, with tendency to have short flat depressions and to grow zigzag. Branching angle very wide. Wood tough. Bark rather smooth except on old branches, yellow brown, exfoliating in small flakes; often striated with gray on young branches.

Twigs.—Medium in length, rather stocky, quite flexible. Branching angle very wide. Wood tough. Nodes large. Internodes quite long ($\frac{1}{2}$ to 2$\frac{1}{4}$ inches). Wood tough. Bark medium in thickness, medium dark green, turning to rusty reddish brown in autumn.

Lenticels.—Very numerous, vary much in size, average small ($\frac{1}{16}$ by $\frac{1}{8}$ to $\frac{1}{16}$ by $\frac{3}{16}$ inch on bark 8 to 10 years old); wide and short, curving sides, bluntly acute ends, raised, light gray, cracks longitudinally through center, but surface of lenticels is seldom very rough. On young wood lenticels very numerous, much raised, light ash gray, very conspicuous.

Foliage.—Tree apt to be rather open, foliage lacks density. Leaves recurve and curve up along midrib. (See Pl. XIX, *B*.)

Blade: Size varies, averages small ($\frac{3}{4}$ by $\frac{1}{2}$ to 1$\frac{1}{2}$ by 3$\frac{3}{4}$ inches). Width varies, averages very wide (ratio of width to length, 2:5). Shape ovate-elliptical or obovate. Base obtuse to moderately acute; origin of margins symmetrical or nearly so. Apex bluntly acute. (Apex one-half or two-thirds of blade usually tapering.) Margins coarsely and deeply crenate; bristles wide, fairly long. Upper surface of blade glossy light green. Lower surface light dull green, somewhat lighter in color than upper. Midrib medium, heavy and prominent, pale green. Veins moderately distinct.

Petiole: Quite long (average $\frac{3}{4}$ inch; ratio of length of petiole to length of blade, 3:10); medium slender, flexible, pale green, slightly tinged with scarlet red in autumn. Groove narrow and shallow to medium in depth. Glands, generally two, seldom more, medium sized, globular, brownish yellow on petiole near base of blade.

Bearing habit.—Inclined to be alternate in bearing habit, averages rather light crops, and the nuts are rather small in dry seasons. Bears on spurs on wood 2 to 5 years old and to a certain extent on 1-year-old laterals. Few compound spurs. Single spurs short to medium in length ($\frac{1}{8}$ to $\frac{1}{4}$ inch), slender to medium in thickness (average, $\frac{1}{8}$ inch); expands suddenly to large and distinctly round disk $\frac{1}{4}$ inch in diameter. Buds long, conical, bluntly tapering; scales dark reddish brown, thin, tough, with very small amount of pubescence on edges.

NUT

Immature nut.—Size rather small ($1\frac{1}{2}$ by $1\frac{1}{8}$ by 1 inches). Shape wide oval; part on ventral side of axis wide oval, part on dorsal side long obovate; plump. Ventral edge much and evenly curved, almost circular; one side of ventral edge frequently more elevated than the other; slight crease sometimes present $\frac{1}{8}$ inch from suture, giving edge a ridged appearance; suture distinct, the entire length of ventral edge, narrow ($\frac{1}{16}$ inch) and shallow ($\frac{1}{32}$ inch). Dorsal edge quite straight near base, curving more sharply near apex. Base tapers abruptly, slopes dorsally, has no cavity. Apex bluntly rounding for one-half the length of nut; style varies in the time it drops, from early to very late; rudiment small.

Hull: Outer surface green, turning slightly yellowish as dehiscence proceeds; pinkish blotches common, and ventral edge at suture frequently pinkish at beginning of dehiscence, especially in times of drought; pubescence very abundant, fine, medium length, gray, felty. Dehiscence starts on ventral edge, and frequently ventral dehiscence is followed by cracks on dorsal edge; base part of hull usually curls outward and apex part inward. Time of dehiscence varies, even on same tree, from August 5 to September 20. Sticktights common.

Hulled nut.—(Pl. XIII, *F.*) Size small (average, $1\frac{3}{16}$ by $\frac{7}{8}$ by $\frac{9}{16}$ inches). Number of nuts to the pound, 190 to 240. Percentage of kernel to nut in hand-cracked samples, 45.

Shape: Wide ovate with tapering apex (part on ventral side of axis cordate; part on dorsal side long ovate). (Viewed edgewise, ovate with widest part near base.) Ventral edge curved most near base, gently curving from middle to apex, thin as a rule; wing medium prominent, thin. Dorsal edge curved gently, curving suddenly at apex; dorsal ridge rather narrow, medium prominent. Base plump, wide, quite sharply dorsally sloping; stem scar large, oval, depressed, sharply dorsally sloping; dorsal shoulder drops off suddenly from edge of stem scar; ventral shoulder rounded and elevated above stem scar. Apex tapering from near base to tip; markedly pointed.

Shell: Rather hard, i. e., in the standard-shell class; outer shell medium thick, either hard and bony or somewhat crumbly; light ash-gray brown in color. Pits very numerous, especially on dorsal edge, medium to large, round and quite deep. Suture line frequently showing on dorsal edge. Short grooves on ventral edge and base. Slight corrugations at base. Canals medium in number, medium size, wide oval. Network of fibers fine. Fibers rather small. Inner shell thin to medium in thickness, very hard. Inner surface medium brown, darker than outer surface of nut. Ventral streak dark brown, medium in length to long, rather wide, with wide blunt or truncate base.

Kernel: Some doubles (9 per cent). Size average, medium ($\frac{7}{8}$ by $\frac{9}{16}$ by $\frac{3}{8}$ inch). Shape plump, ovate, rather wide in proportion to length. Dorsal edge usually curved slightly more than ventral, curved sharply at apex. Base plump; ventral shoulder plump, round, much above dorsal; dorsal shoulder square and sloping much, often dished; ventral shoulder much above dorsal. Apex sharply tapering. Pellicle medium to dark brown; veins distinct; pubescence very short, medium in quantity; pellicle fold small along apex half of ventral edge; base scar very dark brown, rather large and prominent, round or wide oval. Flavor sweet, good.

Distinguishing characteristics.—This nut resembles in many ways the California, King, Klondike, and Princess. It also resembles the Philopena in shape and is even confused with the Nonpareil. It is easily distinguished from the varieties mentioned, except Philopena, by its relatively hard shell, light color of outer surface, and pointed apex. It can be distinguished from the Philopena because it is much smaller. (See descriptions of varieties mentioned for other points.)

COMMENTS

The Silvershell variety attracted attention at one time because of the light-colored shell and rather late blooming habit (March 1 to March 25 in the Sacramento Valley). The nuts have a tendency to run to small sizes, and the tree appears to do poorly except under the very best soil conditions. The variety is no longer popular and is grown only to a limited extent.

OTHER TYPES OF SILVERSHELL

Two seedling varieties of almonds with light-colored shells are wrongly called " Silvershell " in some districts. These seedlings are inferior to the Silvershell in flavor, have less percentage of kernel to shell, and have more doubles.

68. SMITH (SMITH'S X. L.)

Origin.—About 1890 George W. Smith noticed a heavy-bearing seedling tree in his orchard at Brentwood, Calif. For trial purposes he grafted over a number of trees to the seedling, which was later called Smith's X. L. Owing to its heavy bearing and to the fact that the Hatch varieties did not bear well in the district, the Smith almond was received with favor, and since 1910 a considerable acreage has been grafted to the variety in the Oakley district, the only section growing it.

Description

TREES

Moderately vigorous grower, moderately upright (ratio of height of head to width, 1:1¼), outer branches drooping.

Main branches.—Stocky, medium length. Interior branches upright; outer branches drooping. Branching angle acute. Wood rather brittle; bark quite thick and brittle, inclined to be rough and scaly even on young branches; reddish brown, with considerable gray epidermis; exfoliates in small, gray flakes; longitudinal striations marked on wood 3 and 4 years old.

Twigs.—Nodes large, giving twigs a zigzag appearance. Internodes average short (3/16 to 1¼ inches). Bark smooth, brittle, green, slightly tinged with red in fall; slight bloom usually present; bark 2 seasons old frequently green on under side.

Lenticels.—Numerous, vary in size on old wood (average on bark 5 to 6 years old, 1/32 by ⅛ inch); raised, grayish brown, with dark longitudinal crack through center, oval, ends bluntly acute. On young twigs lenticels very numerous, grayish green, distinct.

Foliage.—Quite dense. Leaves on individual branches numerous, slightly wavy, and slightly recurved at apex.

Blade: Size variable (⅞ by 2½ to 1⅜ by 4 inches; average rather large, 1⅛ by 3½ inches); inclined to be wide (ratio of width to length varies from 1:5 to 1:7). Shape generally ovate, many elliptical, some obovate. Base blunt, obtuse, usually rounding; origin of margins symmetrical or slightly unsymmetrical, curving outward. Apex varies, acute, blunt; margins frequently straight near apex. Margins crenate with short, wide, blunt bristle. Upper surface of blade shiny light green, with small amount of bloom. Lower surface dull, light green, with some bloom.

Petiole: Length varies (½ to 1¼ inches; average rather longer than medium, ⅞ inch; ratio of length of petiole to length of blade, about 1:4); varies in diameter. Color green, turning slightly pinkish in late fall. Groove deep and usually narrow, but width varies. Mainrib prominent. Veins distinct. Glands average four, seldom two, frequently six or eight, globular, reddish brown, pairs seldom opposite each other. (Sometimes petiole widens near base of leaf.)

Bearing habit.—Averages good crops. Bears mostly on spurs on wood 2 to 4 years old. Many spurs compound, 1 to 3 inches long, single spurs medium in diameter (⅛ inch) and in length (¼ inch), expands gradually to large, wide, ovate disk ¼ by 5/16 inch. Buds long, tapering, plump at base.

NUT

Immature nut.—Size, average quite large (1⅞ by 1⅜ by 1 inches). Shape flat, wide oval-ovate; ventral edge usually thin, much curved the entire length.

Usually no ridge or only a faint suggestion of one; frequently shallow, ventral grooves each side of suture. Suture depression shallow ($\frac{1}{64}$ inch) and narrow ($\frac{1}{16}$ inch). Dorsal edge gently curved; when present dorsal ridge most prominent at dorsal shoulder. Base bluntly round; dorsally sloping; frequently slightly corrugated and often with slight ventral ridge; ventral shoulder round, rather thin, projecting above level of disk; stem cavity $\frac{1}{32}$ to $\frac{1}{16}$ inch deep and $\frac{5}{16}$ to $\frac{3}{8}$ inch in diameter. Apex bluntly round; style drops early; rudiment small to medium in size.

Hull: Outer surface green, turning yellow and finely brown; frequently lightly grooved; pubescence medium in length, gray, coarse, felty. Dehisces first along ventral edge; dorsal edge cracks at base or apex, and both commonly crack throughout its entire length, the edges of the halves curling inward, the halves remaining attached at the base. Cracks also occur at other places on hull. Ripens last of August and early September.

Hulled nut.—(Pl. XIV, *A.*) Size varies somewhat, rather small to large ($1\frac{1}{4}$ by $\frac{7}{8}$ by $\frac{5}{8}$ to 2 by $1\frac{1}{4}$ by $\frac{13}{16}$ inches). Small in dry seasons. Number of nuts to the pound, 120 to 200.

Shape: Flat, wide ovate. Ventral edge thin, much curved, curve usually slightly less in middle than at apex and base; flange and wing prominent to medium prominent throughout entire length of ventral edge; flange thick near nut; wing thin. One side of ventral edge more rounded than the other, causing flange to appear more prominent on one side than on the other. Dorsal edge moderately curved, curved most near apex, rather thin; dorsal ridge narrow and rather prominent. Base thin, broad; stem scar large, long, and dorsally sloping. Apex thin, wide, bluntly pointed, slightly scimitar shaped; wing prominent at tip and approaching axis at wide angle; dorsal edge curved in sharply, slightly recurved at immediate apex.

Shell: Soft; color dark reddish brown; texture varies somewhat with seasons, being harder in dry years; outer shell very brittle and crumbly or spongy, with tendency to adhere to hull; appears to be more spongy when grown on heavy soil than in case it is grown on light soil; chips off in hulling and shipping operations. Pits medium in number, large, round, or irregular, medium in depth. Shallow grooves on ventral edge nearly parallel to wing and short grooves at base. Canals medium in number, large; fibers coarse. Inner shell rather thin and hard. Inner surface dark brown, slightly undulating. Ventral streak medium in length to long, medium in width; wide at base with truncate or bluntly round basal end. Shell is frequently cracked or broken in harvesting operations, leaving kernels partially exposed.

Kernel: Many doubles and deformed kernels (32 per cent). Large (average $1\frac{1}{8}$ by $\frac{5}{8}$ by $\frac{1}{4}$ inches) flat kernels, slightly variable in width. Shape between I. X. L. and Nonpareil kernels; flat; ovate. Both dorsal and ventral edges curved. Dorsal edge longer than ventral. Base rather flat, usually round, or with dorsal shoulder somewhat square and ventral shoulder slightly sloping. Apex rather thin, usually very bluntly pointed. Pellicle light to dark reddish brown; veins fairly distinct; pubescence very short; pellicle fold small, on apex half of ventral edge; base scar generally small, but prominent, dark brown, oval. Flavor distinctly sweet, pleasant, good.

Distinguishing characteristics.—Nut midway between Nonpareil and I. X. L. in shape; wing quite prominent, apex broadly pointed, base scar much sloping dorsally, shell reddish brown; kernels commonly with dorsal shoulder somewhat square and humped and with deep irregular groove in one or both sides.

The nut resembles in shape the Batham, Henle, I. X. L., and Trembath. For points of comparison of the first three, see distinguishing characteristics under those varieties. The Smith is distinguished from the Trembath by its softer shell and by its kernel with the humped dorsal shoulder and long crease in the side.

COMMENTS

This variety produces a large proportion of deformed and double kernels. The outer shell tends to scuff off, which is a disadvantage in shipping. The good flavor of the kernel, good bearing habit, and rather late blooming tendency are points in its favor. In appearance the nut is inferior to the I. X. L., but it has the advantage of producing well in the Oakley district, where the Hatch varieties do not yield satisfactorily. Under present conditions the Smith almond is not recommended for other districts or where better varieties will bear well.

69. STANDARD

Origin.—A seedling variety originated on P. A. Erickson's ranch, near Oakley, Calif., in 1906. The variety has been propagated and distributed in the Oakley district since 1908. With the exception of a few trees planted at one time in Georgia, it has been grown only in the Oakley section.

Description

TREE

Quite vigorous, slightly spreading (ratio of height of head to width, 1:1), brushy, scraggly, and drooping, produces numerous branches.

Main branches.—Numerous, vigorous, stocky, curving, and drooping. Branching angle obtuse. Wood medium in hardness. Bark rather brittle, quite smooth, dark reddish brown; some striations on wood 2 to 4 years old.

Twigs.—Quite vigorous, rather stocky. Branching angle obtuse. Nodes medium size. Internodes short ($\frac{1}{3}$ to $\frac{3}{4}$ inch). Bark somewhat brittle, smooth, dark green, with some bloom; reddish patches common in fall.

Lenticels.—Very numerous; vary in size (average size on 10-year-old bark, $\frac{1}{16}$ by $\frac{1}{4}$ inch; on 7-year-old bark, $\frac{1}{16}$ by $\frac{1}{8}$ inch); shape oval, ends bluntly acute and tapering, tendency for sides to be straight near middle; much raised; dark gray brown, rough in middle.

Foliage.—Dense. Leaves numerous on individual branches and small; frequently roll upward slightly along rib; usually somewhat recurved at apex; margins frequently wavy. Often leaves are flat.

Blade: Very small (average size, $\frac{5}{8}$ by 2 inches). Width varies, averages wide (average ratio of width to length, about 1:3). Shape ovate-elliptical. Base obtuse, bluntly rounding; origin of margins symmetrical or nearly so. Apex varies, acute to bluntly acute; inclined to taper. Margins usually curve gradually, deeply and irregularly crenate, bristles short. Upper surface of blade smooth, light green. Lower surface lighter than upper. Midrib slender and prominent. Veins moderately distinct.

Petiole: Length varies from $\frac{3}{8}$ to $\frac{5}{8}$ inch; average short, or medium for size of blade ($\frac{1}{2}$ inch), (ratio of length of petiole to length of blade, about 1:4); slender, flexible. Tinged with red in fall. Groove narrow, shallow. Glands usually two, occasionally more; on petiole near base of blade.

Bearing habit.—Quite heavy and regular bearer in Oakley district. Bears mostly on spurs on wood 2 to 4 years old. Spurs frequently compound, some live longer than 1 year. Single spurs long ($\frac{3}{8}$ inch), stocky ($\frac{3}{16}$ inch); expand gradually to oval disk $\frac{3}{16}$ by $\frac{1}{4}$ inch. Buds free, plump, pointed at apex, slightly constricted at base.

Immature nut.—Size average medium to large ($1\frac{1}{2}$ by $1\frac{1}{4}$ by $1\frac{1}{8}$ inches). Shape plump, wide oval or ovate oval. Ventral edge evenly curved. Dorsal edge curved less than ventral. Base plump, round, at right angles to axis; stem cavity $\frac{1}{16}$ inch deep. Apex bluntly rounded, sometimes slightly pointed.

Hull: Outer surface green, turning to brownish green while dehiscing; pubescence long, gray, coarse, woolly. Inner surface turns brown rapidly when dehiscing. Dehisces on ventral edge, the edges tending to roll inward. Sometimes dorsal edge cracks, but not usually. Ripens in late August and early September.

Hulled nut.—(Pl. XIV, *B.*) Size varies much, usually rather large ($1\frac{1}{4}$ by 1 by $\frac{11}{16}$ to $1\frac{5}{8}$ by $1\frac{1}{8}$ by $\frac{3}{4}$ inches; average, $1\frac{3}{8}$ by 1 by $\frac{3}{4}$ inches). Number of nuts to the pound, 120 to 160. Varies in plumpness and in ratio of width to length. Percentage of kernel to nut in hand-cracked samples, 38.

Shape: Irregular, wide or long (average length medium), oval or ovate. Ventral edge sharply curved; ventral flange wide, either prominent or not prominent; wing thin to medium in thickness, prominent to medium prominent, usually most prominent near apex; ventral edge on one side of flange has long, wide groove or depression. Short shallow grooves present on ventral edge oblique to ridge. Dorsal edge varies in curve from rather straight to much curved; ridge usually prominent. Base may be wide and truncate, round, or somewhat constricted; stem scar usually large, wide, oval, at right angles to axis, or slightly sloping either dorsally or ventrally. Apex varies much, acutely pointed to broadly truncate; when round or truncate it ends in a very small mucronate tip.

Shell: Light to medium brown; varies from a soft shell that can be cracked with the fingers to a hard shell; averages rather hard shell; outer shell usually somewhat brittle, but many times hard and flinty. Pits very numerous, as a rule, small to large, generally round, deep, extending over dorsal edge up to ridge. Ridge usually marked with fine short grooves. Short grooves at base. Base frequently corrugated. Canals vary in size; usually few large and many small; round or oval. Network of fibers rather fine. Few fibers large; many small. Some spongy material between outer and inner shell. Inner shell thick, hard, inner surface dark brown, darker than outer surface and frequently marked with lighter brown streaks. Ventral streak varies in width, length, and shape, averages rather short; base usually wide and blunt, but sometimes acute.

Kernel: Medium in size (average, ⅞ by ⅝ by ⅜ inch), but varies much as to size and shape. Many doubles (52 per cent). Single kernels, ovate or oval, plump or flat, many distorted. Ventral and dorsal edges vary in curve. Base usually round; dorsal shoulder round or slightly square. Apex usually blunt, thin or plump. Pellicle thin; usually light brown; veins distinct; pubescence varies, usually smooth at base and short at apex; pellicle fold very short; base scar medium in size, dark brown, usually round. Flavor pleasantly sweet, fair.

Distinguishing characteristics.—This nut and its kernel resemble the Reams in many ways, but has more doubles. It is necessary to read the entire description in order to identify it.

COMMENTS

Although the variety appears to bear well and the flavor of the kernel is fair, the small percentage of kernel to shell and the high percentage of doubles are sufficient points of disadvantage to make it unpopular in the market.

70. SULTANA

Origin.—A well-known Spanish variety, introduced into the United States at an early date. It was first planted in the East, trees being listed for sale by nursery firms in New York as early as 1843. Trees of the Sultana almond were brought to California from the East in 1853. Attempts were made to grow the variety in Pennsylvania in the early seventies and in Georgia in the eighties. Later plantings were made in Florida, Mississippi, and Texas. It is doubtful if any one almond variety has been planted under a wider range of conditions. It was soon found that the Sultana could be grown commercially only in a few limited areas which were practically frost free in the spring. In California the variety is grown less now than formerly, many of the orchards having been removed. Most of the commercial production of the variety is in the Oakley district, although Sultana trees are found in several other sections.

Description

TREE

Round topped, rather tall grower, but of drooping habit, less spreading than Drake (ratio of height of head to width, 1:1), scraggly. Trunk rather slender, inclined to make slow growth; bark rough, with smooth patches; exfoliates in large flakes.

Main branches.—Quite stocky, tend to grow slowly, somewhat zigzag. Branching angle obtuse. Wood medium hard. Bark medium tough, reddish brown, with grayish epidermis; exfoliates in medium-sized flakes. Striations very marked on wood 2 to 4 years old.

Twigs.—Medium stocky, rigid. Wood medium tough. Nodes large. Internodes short (¼ to ¾ inch, occasionally longer). Bark with surface leathery in texture, very light green in color, with considerable bloom, turning in autumn to dark green tinged with red.

Lenticels.—Medium in number; raised, brown or grayish brown. On old bark narrow, long, oval, with acute ends. On young bark wide oval, with bluntly acute ends. Size varies much, sometimes very large (on 8-year-old bark, average ⅛ by ⅜ inch; on 5-year-old bark, 1/16 by ⅜ inch).

Foliage.—Of deeper green than in most varieties. Dense. Leaves numerous, many borne in clusters, become light green in fall, very much curled and crinkly in late fall, as in some peach varieties.

Blade: Varies much in size (⅝ by 1¼ to 1½ by 5 inches; average large, 1 by 3¾ inches; ratio of width to length, about 2:7). Shape ovate or elliptical-ovate. Base obtuse to bluntly acute; sometimes tapering; origin of margins symmetrical or nearly so. Apex usually tapering and acute. Margins irregular; crenations irregular, deep and short; exceedingly small dark bristle. Midrib large, very prominent, pale green. Veins large and distinct. Upper surface of blade dull deep green, varying much in color in late summer; lower surface lighter than upper.

Petiole: Rather long (⅞ to 1¼ inches; average, 1⅛ inches; ratio of length of petiole to blade, about 2:7); rather stocky and rigid. Groove variable in width, shallow, bright green; reddish tinge common early in fall. Glands one to eight, commonly four, frequently six, occasionally none; very small, roundish, flat topped, greenish or yellowish.

Bearing habit.—This variety seems to be peculiar in that it bears well on heavy soils. It appears better adapted to heavy soils than the other commercial varieties of almonds, provided the soil has good drainage. On light soils, especially in dry seasons, the Sultana tree bears many sticktights. Bears mostly on spurs on wood 2 to 4 years old; a considerable number on 1-year-old laterals. Spurs short (3/16 to ¼ inch); stocky (3/16 to ¼ inch); expands gradually to large, wide, oval disk (¼ by 5/32 inch). Buds free, very large, very long, constricted at base, very plump in middle; pointed; scales rather small, thin, with much long pubescence on edges.

NUT

Immature nut.—Size, quite large (1¾ by 1⅜ by 1⅛ inches). Shape plump, wide ovate (part on ventral side of axis ovate or cordate-ovate; part on dorsal side long oval or ovate), widest portion of nut one-third to one-half way from base to apex. Ventral edge much curved; suture depression shallow (1/64 inch); narrow (1/32 inch). Dorsal edge gently curved; frequently with slight ridge. Base very plump, dorsally sloping, with short grooves and ridges; dorsal shoulder lacks prominence; ventral shoulder somewhat cordate; cavity ½ inch in diameter and 1/32 to 3/32 inch deep. Apex plump, round pointed; depressed somewhat along suture, especially to ventral side of rudiment; style drops rather early; rudiment rather large.

Hull: Outer surface green, turning yellowish green and later dark brown while dehiscing; pubescence abundant, short, fine, gray, felty. Inner surface rapidly turns to light brown while dehiscing; during early stages of dehiscence hull has slight reddish tinge along ventral edges. Dehisces first along entire ventral edge and often on dorsal edge as well, the halves spreading apart at base, remaining attached together at apex; hull tends to curl outward along entire ventral edge; frequently dehisces on ventral edge only. Ripens August 5 to 30.

Hulled nut.—(Pl. XIV, *C.*) Size rather large (average, 1½ by 1⅛ by ¾ inches). Number of nuts to the pound, 110 to 140. Percentage of kernel to nut, 37.

Shape: Rather flat and wide in proportion to length, part on ventral side of axis cordate; part on dorsal side oval-ovate or long ovate. (Edgewise view, ovate with cuneiform apex.) Ventral edge curves rather sharply, flange quite thick and prominent to medium prominent, but brittle and crumbly, portions of it breaking off with hull, leaving a thin prominent wing running from stem scar to apex; wing most prominent along lower half of ventral edge. Dorsal edge rather plump, slightly curved, curved most at base and apex ends; suture line frequently showing. Base wide, truncate, sloping dorsally; rather thin; stem scar small to medium, narrow, long, oval; dorsal shoulder drops off rather abruptly from stem scar; ventral shoulder elevated above stem scar, wide, sharply rounded. Apex rather thin; bluntly tapering, with sharply curved ventral edge and gently curving dorsal edge and wing clear to apex.

Shell: Very dark brown; just within the hard-shell class; outer shell, thick, porous, somewhat brittle. Pits very numerous, vary in size on same nut, small to medium, deep, and present on dorsal edge as well as on sides; portion of shell between pits coarsely stippled; short grooves along ventral edge, base, and flange; canals numerous, large, oval; fibers large; network coarse. Inner shell thick, hard. Inner surface dark brown, undulating. Ventral streak very dark brown, medium in width to very wide, long, tapering for a considerable distance along basal half; base end acuminate; apex acuminate.

Kernel: Large (average, 1⅛ by ⅝ by 5/16 inches). Kernels inclined to be deformed or with long, crooked, deep depression on one or both sides, due to tendency to form doubles, but doubles are not numerous. Shape flat, cuneiform ovate, tapering from near base to apex. Widest part near base. Ventral edge rather thin, curved about same as dorsal, or less, and only about one-half as long. Dorsal edge thin, usually curves more at apex than ventral edge. Base wide, thin; ventral shoulder rounded; dorsal shoulder more prominent than ventral and thinner, with tendency to be straight for some distance from stem scar and sloping, having a slight hump. Apex long, thin, tapering, i. e., somewhat cuneiform. Pellicle varies from dark brown to very dark brown; rather thin, moderately tender, quite smooth near base; short pubescence near apex; veins large and very distinct; pellicle fold small and thin; base scar medium size, brownish gray, nearly round. Flavor slightly sweet, fair.

Distinguishing characteristics.—This variety belongs to the group including the Grosse Tendre and Hampton. In fact, it can be distinguished from these two varieties only with difficulty.

Note.—The California is often wrongly called "Sultana," and the name "Sultana" is sometimes incorrectly applied to the Princess.

COMMENTS

The dark shell and high percentage of deformed kernels of the Sultana are against it. The nut is not liked by the market and should not be grown commercially.

71. TARRAGONA

Origin.—A Spanish variety. The exact date of the first plantings of the Tarragona in California is not known, but the largest acreage existed between 1890 and 1905, most of the plantings being in the Oakley-Antioch districts. Plantings were made in the Santa Clara Valley and also in the Suisun district. The variety is grown much less now than formerly. Efforts have been made to grow the Tarragona in Tennessee and in Texas. Large quantities of Tarragona nuts are imported into the United States.

Description

TREE

Very upright (ratio of width of head to height, 1:1⅛). Trunk rather stocky, long, with flat depressions; bark distinctly reddish, exfoliating in large flakes.

Main branches.—Long, medium stocky, upright. Branching angle acute. Wood and bark tough. Branches with long depressions (i. e., cross section seldom round).

Twigs.—Medium in length, stocky, and rigid, grow straight or slightly wavy. Branching angle acute. Nodes small. Internodes medium in length (½ to 1½ inches). Bark green, smooth, turning reddish in fall.

Lenticels.—Numerous, very large (on wood 8 to 12 years old, 1/16 by ¼ to ⅛ by ½ inch), wide, oval; ends bluntly acute; extreme apexes frequently acuminate, sides curving sharply outward; gray, usually depressed in center. On twigs, large, numerous, grayish green. (See Pl. XVII, *E.*)

Foliage.—Moderately dense. Leaves on individual branches medium in number, very curly and crinkly.

Blade: Size varies much (½ by 2¼ to 1¼ by 4 inches; average medium, ⅞ by 3 inches; ratio of width of blade to length, 2:7). Shape usually ovate, sometimes elliptical. Base obtuse to acute; origin of margins symmetrical or nearly so; margins curving outward. Apex tapering and acute, margins tend to straighten near apex. Margins curve much near middle or at point one-third of distance from base to apex; deeply and shortly crenate; bristle dark and short. Upper surface of blade light green. Lower lighter green than upper. Midrib thick, prominent, pale in color. Veining very distinct.

Petiole: Length short to medium (½ to 1 inch; average, ¾ inch; ratio of length of petiole to length of blade about 1:4); stocky, rather inflexible. Pale green, tinged with red in autumn. Groove shallow, medium wide. Glands two to four, globular, rather large yellowish glands on petiole near base of blade.

Bearing habit.—Varies much. Bears on spurs, mostly on 2 and 3 year old wood. Spurs long, ¼ to 5/16 inch; rather stocky (¼ to 3/16 inch); expand suddenly to oval disk ¼ by 5/16 inch. Buds inclined to be appressed, short, apex bluntly pointed, conical or slightly flattened.

NUT

Immature nut.—Size quite large ($1\frac{5}{8}$ by $1\frac{1}{4}$ by $1\frac{1}{8}$ inches). Shape wide ovate, plump. (Edgewise view ovate with plump base.) Ventral edge much curved, prominently ridged, especially near apex (ridge $\frac{1}{4}$ to $\frac{5}{16}$ inch wide, $\frac{1}{16}$ to $\frac{1}{8}$ inch high); ventral suture depression $\frac{1}{16}$ inch wide and $\frac{1}{32}$ inch deep, usually extending one-fourth of way up dorsal side at apex. Dorsal edge considerably curved, tendency to have ridge, especially along apex half. Base plump, dorsally sloping, grooved, and scalloped, cavity $\frac{1}{4}$ to $\frac{3}{8}$ inch wide, $\frac{1}{32}$ to $\frac{1}{16}$ inch deep. Apex rather thin, bluntly round, but slightly tapering and slightly depressed; style remains late; rudiment small.

Hull: Outer surface green; turning yellowish and finally reddish brown; pubescence very abundant, short, gray, felty. Inner surface light colored when dehiscence starts, turning later to dark reddish brown. Dehisces along ventral edge and usually a short distance on base end of dorsal edge; ventral edges spread open near middle and curl inward; halves of the hull remain attached to each other near apex. Ripens last of August and first of September.

Hulled nut.—(Pl. XIV, *D.*) Size medium to quite large (average, $1\frac{3}{8}$ by $1\frac{1}{8}$ by $\frac{3}{4}$ inches). Number of nuts to the pound, 120 to 170. Percentage of kernel to nut in hand-cracked samples, 37.

Shape: Wide ovate, very wide in proportion to length; part on ventral side of axis distinctly cordate; part on dorsal side long ovate. (Viewed edgewise, ovate; fairly plump at base, tapering from near base to apex; sides at apex either bulging or straight, giving apex a cuneiform appearance.) Ventral edge ridged, much curved; flange medium thick, very prominent; wing thin, exceedingly prominent entire length of ventral edge, generally most prominent one-third way from apex to base. Wide depression along ventral edge to one side of the ventral flange with accompanying ridge common. Dorsal edge gently curved, curved most near apex. Base plump, broad, much sloping dorsally; dorsal shoulder slopes very abruptly from stem scar; ventral shoulder round and elevated above stem scar. Stem scar long, narrow, oval, depressed. Apex wide, blunt, but wing ends in sharp point; usually somewhat cuneiform when viewed edgewise; extreme apex thin.

Shell: Light yellowish brown; varies somewhat in texture; on the border line between soft and hard; outer shell quite thick and either hard and bony or somewhat porous and crumbly. Pits medium to numerous in number, medium size, round, and present on dorsal edge as well as on sides; very few pits at base. Short, narrow grooves near base and frequently on sides, especially near apex; short oblique grooves on ventral edge each side of wing and on ventral flange. Canals few in number, large, oval. Fibers large. Network coarse. Inner shell quite thick and hard. Inner surface light brown, but darker than outer surface; smooth or undulating. Ventral streak brown, long, wide, with acuminate apex; base usually tapering from middle to base end.

Kernel: Few doubles (3 per cent). Size medium to rather large (average, 1 by $\frac{5}{8}$ by $\frac{7}{16}$ inch). Usually plump. Ovate, generally tapering somewhat from base, giving apex a cuneiform appearance, but varies in this respect. Ventral edge more curved than dorsal and about same length. Base rather wide and sloping dorsally; dorsal shoulder round, wide, sloping; ventral shoulder round, higher than dorsal and much more plump. Apex thin, variable in width; pellicle dark reddish or yellowish brown; tough; pubescence abundant; pellicle fold heavy and thick, usually running from apex to middle of ventral edge. Base scar very large, nearly round, and covered with pubescence. Flavor slightly sweet. Fair only.

Distinguishing characteristics.—Nut easily distinguished from other varieties of similar size by the cordate-oval shape, very prominent flange, and wing; base much sloping dorsally; wide blunt apex and long cuneiform very pubescent kernel. Resembles in shape the Garwood, Bidwell, and Washington. It is easily distinguished from the first two by its thinner flange, while the Washington is more rectangular in shape with a much more truncate apex.

COMMENTS

The shell is too hard and the proportion of kernel to nut is too small to make this variety desirable. The flavor is fair only. Neither the kernel nor the nut is attractive in appearance. The variety enters the market as a cheap nut. In

California it ripens so late as to be caught frequently by the first fall rains. Perhaps the only point in its favor is its rather late blooming habit. It should be eliminated from California commercial orchards.

72. TEXAS (TEXAS PROLIFIC)

Origin.—Supposed to have originated in Texas, but thought by many to be a seedling of the Languedoc. In California it was first grown in the Acampo district. It is now grown in every almond-growing section in California. Including young nonbearing trees, there are more trees of the Texas in California than of any other one variety.

Description

TREE

Rather vigorous grower, upright (ratio of width of head to height, 1:1½). Trunk medium stocky, straight; bark smoother than in many other varieties, cracks close together, exfoliates in small flakes.

Main branches.—Rather long and stocky, tend to grow upright. Produce medium number of laterals. Flat depressions common, twisted somewhat, but less than in Languedoc and much less than in I. X. L. Branching angle sharply acute. Wood medium brittle. Bark rather smooth, dark reddish brown, sometimes appearing grayish brown; exfoliates in small, thin flakes.

Twigs.—Moderately vigorous grower, medium stocky. Branching angle sharply acute. Wood slightly brittle. Nodes rather small. Internodes medium in length (½ to 1½ inches). Bark rather tough, pale green, with some waxy bloom.

Lenticels.—Variable in number and size (average slightly below medium in number and slightly above medium in size, on bark 8 to 10 years old, $\frac{1}{16}$ by ⅛ to $\frac{3}{16}$ by ½ inch; average, about ⅛ by ¼ inch); raised, gray, long oval, rather rough on surface, apexes acute, sides of older lenticels rather straight. On young branches frequently rendered inconspicuous by presence of gray epidermis.

Foliage.—Medium in density. Leaves medium in number on individual branches; flat, with the exception of tendency to recurve and to roll up along midrib. (Pl. XXVI, *B*.)

Blade: Size ⅚ by 2¼ to 1¼ by 3½ inches; average, medium (1 by 3 inches; ratio of width to length, about 1:3). Shape broad ovate. Base acute to obtuse, origin of margins symmetrical or nearly so. Apex half more or less tapering. Apex acute. Margins crenate, length of crenations variable, depth rather shallow. Upper surface of blade dark green; lower surface dull light green. Midrib medium large, prominent, pale. Veins distinct.

Petiole: Length ½ to 1⅛ inches; average, medium (⅞ inch; ratio of length of petiole to length of blade, about 2:7); medium stocky, medium rigid. Light green, tinged with red in fall. Groove narrow, deep near blade, shallow elsewhere. Glands none to four; frequently one, commonly two, occasionally three, seldom four; when one or two, generally on base of blade, but sometimes on petiole; exceedingly small, round or oval, grayish brown.

Bearing habit.—Inclined to be somewhat alternate in bearing, average heavy crops. Nuts small except on young trees, especially when crop is heavy. Bears on spurs, in clusters, on wood 1 to 8 years old, spurs frequently live and bear two years and occasionally three or four years. Single spurs medium in length (¼ inch) and thickness (⅛ inch); expands gradually to roundish disk ⅜ inch in diameter. Buds large, long, tapering; scales large, thin, dark brown, moderately tough, with short pubescence on edges.

NUT

Immature nut.—Rather small (average, 1⅜ by 1¾ by 1 inches). Shape short irregular ovate; part on dorsal side of axis oblong oval, on ventral side ovate or slightly cordate; plump; ventral ridge present (¼ inch wide), grooved at each side. Dorsal edge less curved than ventral, curves squarely at base, frequently ridged or bulged at apex. Base round, sloping dorsally, grooved very slightly; stem cavity practically missing. Apex tapers from middle down, slightly truncate or depressed; style falls early; rudiment small, pubescent.

Hull: Outer surface inclined to be bumpy and sometimes short grooves present; pubescence very abundant, light gray, medium in coarseness, short to medium in length. Dehisces first on ventral edge, usually dorsal edge cracks also, but frequently not until hull is well open; cracks at apex common; halves remain attached together at apex for a considerable time. Ripens August 20 to October 10, depending upon season and locality.

Hulled nut.—(Pl. XIV, *E.*) Size quite variable; usually small ($\frac{7}{8}$ by $\frac{3}{4}$ by $\frac{9}{16}$ to $1\frac{3}{8}$ by 1 by $\frac{3}{4}$ inches, average $1\frac{1}{8}$ by $\frac{7}{8}$ by $\frac{11}{16}$ inches). Number of nuts to the pound, 180 to 250. Percentage of kernel to shell in machine-cracked orchard run, 36.

Shape: Wide oval or oval-ovate; short in proportion to width (viewed edgewise, plump oval tapering at both ends, but plump with sharply curving sides). Ventral edge much curved, curved most near base and least near middle; plump. Frequently long, wide depression along one or both sides of ventral flange entire length of ventral edge with ridge just outside of depression. (When two depressions are present, one is deeper than the other.) Flange prominent to medium prominent, usually more prominent on one side than on the other; wing quite prominent, projecting a very short distance from flange; flange and wing least prominent at extreme apex and most prominent near middle as a rule. Dorsal edge curved considerably less than ventral, curve gradually increasing from middle of edge to apex; curves most near apex. Dorsal edge broad with tendency to a wide prominent ridge along entire edge. Base plump, round, slightly constricted laterally at immediate base; stem scar rather large, oval, at right angles to axis or sloping slightly dorsally. Apex plump, rounded, with very short wide sharp point.

Shell: On border line between soft and hard; light yellowish brown; varies somewhat in texture; outer shell usually hard, medium thick. Pits small to large, usually numerous, round, deep, surface between pits stippled. Surface pitted up to dorsal ridge. Short distinct grooves on ventral edge oblique to wing. Short corrugations at base common. Canals medium numerous, large, wide oval, fibers large, network rather coarse. Inner shell thick, inner surface somewhat undulating, medium brown, darker than outer surface. Ventral streak very dark brown, medium long, very wide, tapering from middle to apex, abruptly ending in acute apex; base end wide and round or very obtusely pointed.

Kernel: Size average rather small ($\frac{3}{4}$ by $\frac{17}{32}$ by $\frac{3}{8}$ inch). Very plump, short, wide. Ovate or cuneiform-ovate. (Edgewise view, cuneiform-ovate with sides curving.) Both edges gently curving. Dorsal edge thinner than ventral and slightly longer, usually increasing in curve at apex. Base very plump; ventral shoulder plump and rounding; dorsal shoulder sloping with tendency to hump, thinner than ventral. Kernel tapers with slightly curving sides and apex, giving apex a cuneiform appearance. Pellicle rich dark brown, thin, rather tender; pubescence very short, most abundant at apex, very little at base; veins distinct; pellicle fold small, extending from apex one-third of way to base on ventral edge; base scar dark brown, rather prominent, round, wide, oval or irregular, with short pubescence. Kernel very light colored after pellicle is removed. Flavor, slight trace of bitter.

Distinguishing characteristics.—The shape of the nut places the Texas in the group including the Ballard, Drake, Languedoc, Lewelling, Pistache, and Spagon. For points of difference between the Texas and any of these varieties, see the descriptions under the varieties mentioned. The Texas nut is easily identified from practically all edible almond varieties resembling it in shape by the slight but distinct bitter flavor of its kernel.

COMMENTS

On account of its late blooming season, the blossoms of the Texas almond trees usually escape spring frosts in those localities suited to almond culture, and consequently they average good crops. The variety has been very widely advertised and has received much favor from the growers. It is unfortunate that from the marketing standpoint the Texas nut is not desirable in the shell. The nut is smaller than the Drake and therefore can not compete with that variety in the market. The slight bitter tinge of the kernel is also objected to by many. The kernels of the Texas, however, are plump and attractive in appearance and fairly well suited to supplying the confectionery trade. If conditions become such that the nuts can be cracked profitably by machinery and the kernels sold, it is probable that the rapidly increasing production of this variety can be taken care of. The Texas almond in the shell can only be disposed of at low prices. The marketing of the Texas nuts is increasingly difficult on account of the enormous acreage of new plantings of the variety coming into bearing.

73. TREMBATH (BAKER'S SEEDLING, TREMBATH SEEDLING, TREMBATH I. X. L.)

Origin.—A seedling tree on the Baker ranch, Oakley, Calif., came into notice in 1906. It was propagated and distributed in the Oakley-Antioch district by John Trembath, of Antioch, and with the exception of a few trees the variety is grown only in this district.

Description

TREE

Medium in vigor, tall, upright (ratio of width of head to height, $1:1\frac{1}{4}$). Trunk, medium stocky, straight; bark rough, exfoliating in large patches, reddish brown.

Main branches.—Many branches. Medium in length; quite stocky; branches well distributed; all except outer and lower ones grow upright. Branching angle wide, branches curving upward or slightly wavy in growth. Wood brittle. Bark smooth except for knots, reddish brown.

Twigs.—Medium in length, quite stocky. Branching angle wide, twigs curving upright. Nodes considerably greater in diameter than internodes. Bark smooth, green.

Lenticels.—Medium to numerous in number, large (on wood 8 to 10 years old, $\frac{1}{16}$ by $\frac{3}{16}$ to $\frac{1}{16}$ by $\frac{1}{4}$ inch); often several run together, forming a large lenticel; oval, dull gray or brownish gray, much raised, much cracked, wide, usually tapering from middle to acute or acuminate apexes. Lenticels increase in width and only a little in length as bark gets older.

Foliage.—Moderately dense. Leaves twisted and curled, medium to rather large, medium to numerous in number on individual branches.

Blade: Small to rather large in size ($\frac{7}{8}$ by $2\frac{1}{2}$ to $1\frac{1}{4}$ by $3\frac{1}{2}$ inches; average, 1 by $3\frac{1}{4}$ inches). Wide in proportion to length, but varying greatly in width (average ratio of width to length, about 1:3). Shape elliptical or obovate. Base usually obtuse; origin of sides symmetrical or slightly unsymmetrical. Apex varies much; round, bluntly obtuse, or acute. Margins gently curved; crenations long, shallow, bristle fine, dark gray. Upper surface glossy light or deep green. Lower surface very light green, with a small amount of bloom. Midrib prominent, very light green. Veins distinct.

Petiole: Varies in length from $\frac{1}{2}$ to 1 inch, irrespective of length of blade, rigid; stocky; flattens and widens slightly near base of blade. Groove deep and wide and darker in color than rest of petiole. Glands usually two, reddish brown.

Bearing habit.—Average production good. Nuts borne singly or in clusters on spurs mostly on wood 2 and 3 years old; some on wood 4 and 5 years old. Spurs long ($\frac{1}{4}$ to $\frac{1}{2}$ inch); stocky ($\frac{3}{16}$ to $\frac{1}{4}$ inch); expands gradually to oval disk $\frac{1}{4}$ by $\frac{5}{8}$ inch. Buds quite free, short, wide, pointed.

NUTS

Immature nut.—Size medium to large ($1\frac{7}{8}$ by $1\frac{9}{16}$ by $1\frac{1}{8}$ to $2\frac{1}{4}$ by $1\frac{3}{4}$ by $1\frac{1}{4}$ inches). Shape cordate; i. e., part on ventral side of axis cordate; part on dorsal side oblong oval. Edgewise view oblong ovate. Ventral edge most curved at base with tendency to be more straight at apex; slightly ridged (ridge $\frac{3}{8}$ inch wide and one side $\frac{1}{16}$ to $\frac{1}{8}$ inch deep). Dorsal edge shorter than ventral, very gently curved, curved most at apex; usually ridged. Base plump, with very deep short grooves; dorsal shoulder round and elevated, projecting $\frac{1}{4}$ inch from center of disk then dropping off abruptly; cavity large ($\frac{3}{8}$ to $\frac{5}{8}$ inch wide), deep ($\frac{1}{8}$ inch). Apex bluntly pointed, sloping on ventral edge, giving it a tapering appearance; deeply depressed; style remains late; rudiment very small.

Hull: Green, turning reddish brown at time dehiscence starts or slightly before; pubescence very short, fine, thick, felty. Inner surface turns rapidly from light green to brown during dehiscence. Edges of opening hull pinkish brown during early dehiscence. Dehisces on ventral edge, the edges of the hull curling inward at apex and outward at base; frequently dorsal edge cracks at apex or base or both, but only occasionally are the halves of hull completely divided; other cracks often occur on apex and base of hull. Ripens August 20 to September 25.

Hulled nut.—(Pl. XV, *C.*) Size varies much; small in dry seasons, average medium (1⅜ by ⅞ by ⅝ inches). Number of nuts to the pound, 130 to 170. Percentage of kernel to nut in hand-cracked samples, 58.

Shape: Rather flat, medium long, pointed, ovate (viewed edgewise, long tapering, ovate). Ventral edge gradually curved, most curved near base or near middle, with tendency to decrease in curve near apex; ventral flange medium in thickness, prominent to medium prominent; wing rather thin, very prominent entire length of ventral edge. Longitudinal depressions accompanied by ridge common. Dorsal edge somewhat curved, but less so than ventral edge; dorsal ridge narrow and fairly prominent; suture line frequently showing. Base plump; may be wide or somewhat constricted; dorsal shoulder drops off abruptly near edge of stem scar; ventral shoulder sharply rounding or sloping; stem scar rather small, narrow, oval, and at right angles to the axis or slightly sloping dorsally. Apex tapering, with rather prominent wing ending in a thin sharp point.

Shell: Very soft; outer surface light brown in color, usually brittle and crumbly. Pits few to medium in number, large and fairly deep. Surface between pits stippled. Network coarse, fibers large. Canals very large, oval. Inner shell thin and hard. Inner surface undulating, light yellowish brown in color. Ventral streak dark brown, very long, medium in width, tapering from middle to base, base acuminate.

Kernel: Size rather large (average, 1⅛ by ⅝ by ⅜ inches). Plump, long, oblong-ovate. One side frequently has long groove or crease. Ventral edge gently curved. Dorsal edge curved less than ventral, thinner and longer. Base usually somewhat truncate, sometimes round; dorsal shoulder usually somewhat square; ventral shoulder abruptly rounding. Apex rather broad. Pellicle dark brown, thick, tough; pubescence exceedingly thick and long, giving it a very rough appearance; pellicle fold small. Flavor slightly sweet, fair.

Distinguishing characteristics.—Nut medium in length, rather pointed ovate, shell soft, wing thin and quite prominent along entire ventral edge, ending in sharp point at apex, base plump, stem scar at right angles to axis or slightly sloping dorsally; kernel large, long, oblong-ovate, pellicle dark brown, pubescence heavy.

The Trembath resembles in shape the Batham, Henle, I. X. L., and Smith. (See "Distinguishing characteristics" of these varieties for points of difference.)

COMMENTS

The outer shell of the Trembath nut crumbles badly. The appearance of the kernel with its coarse, rough, dark-brown pellicle is not attractive. The flavor of the kernel is inferior to that of the I. X. L. The large size of the nut when grown under favorable conditions and the large plump kernel are points in its favor. The Trembath nut should not be grown where the I. X. L. will do well.

74. WALTON (WALTON PAPER SHELL)

A seedling variety originated on the John Walton ranch, near Oakley, Calif., about 1890. A considerable number of trees of the variety were planted in the Oakley district. With the exception of a few scattering trees the Walton is not found elsewhere.

Description

TREE

Upright with wide top (ratio of height of head to width, 1:1⅛), quite vigorous. Trunk quite stocky; bark reddish brown, less rough than in most varieties, exfoliates in thin flakes.

Main branches.—Medium in length and stockiness, tend to grow slightly curved or wavy. Branching angle acute. Wood tough. Bark reddish brown, with patches of gray epidermis; exfoliates in small flakes; striations common on wood 1 to 4 years old.

Twigs.—Rather short and slender as a rule. Internodes short to medium in length (¼ to 1 inch). Nodes considerably larger in diameter than internodes. Bark smooth, deep green with reddish patches near nodes in fall.

Lenticels.—Very numerous, large (on wood 8 to 10 years old, $\frac{1}{16}$ by $\frac{1}{4}$ to $\frac{3}{32}$ by $\frac{1}{2}$ inch). On level with surface of bark except on bark older than 8 years, where they are slightly raised. Gray; shape wide oval, tendency to have straight sides near middle and bluntly acute ends; usually cracked longitudinally through middle. On young wood lenticels short with gently curved sides. Exceedingly numerous, rather large, and grayish green on twigs.

Foliage.—Medium in density. Leaves medium in number on individual branches, inclined to curl and twist slightly.

Blade: Variable in size ($\frac{1}{2}$ by 2 to $1\frac{1}{4}$ by $3\frac{3}{4}$ inches; average slightly under medium, $\frac{7}{8}$ to $2\frac{7}{8}$ inches; ratio of width to length, about 2:7). Shape elliptical, ovate, or obovate. Base acute or obtuse. Apex bluntly acute. Margins deeply and shortly crenate; bristles dark gray, broad. Midrib medium heavy and prominent, pale green. Veins distinct. Upper surface of blade glossy, medium deep green; lower surface light green. Frequently some bloom present.

Petiole: Varies in length and thickness; average medium ($\frac{7}{8}$ inch; ratio of length of petiole to length of blade, about 2:7). Petiole green, but tinged with red in fall. Glands one to six, mostly two, small, oval, yellowish; on petiole near base of blade.

Bearing habit.—Bears quite well. Nuts frequently in clusters, mostly on wood 2 and 3 years old. Compound spurs sometimes live two years; long (1 to $1\frac{1}{2}$ inches). Single spurs long ($\frac{1}{4}$ to $\frac{3}{8}$ inch); slender ($\frac{5}{32}$ to $\frac{3}{16}$ inch); expands very suddenly to oval disk ($\frac{7}{32}$ by $\frac{9}{32}$ inch). Buds free, medium size, short, plump in middle, tapering apex, base constricted; scales coarse, thick, rather small.

NUT

Immature nut.—Size small to medium ($1\frac{1}{2}$ by $1\frac{1}{4}$ by $\frac{7}{8}$ inches). Rather flat. Broad oval (part on ventral side of axis ovate; part on dorsal side oblong oval). Edgewise view, ovate. Ventral edge much curved, especially at apex; usually without ridge; one side frequently higher than other; ventral suture depression narrow ($\frac{1}{32}$ inch) and shallow ($\frac{1}{64}$ inch), usually deepest at immediate base. Dorsal edge gently curved, narrow, tendency for slight bump or ridge to be present at apex. Base rounding or slightly truncate; sharply sloping dorsally, heavily grooved with short grooves, or scalloped; cavity deep ($\frac{1}{64}$ inch), diameter ($\frac{5}{16}$ to $\frac{3}{8}$ inch). Apex thin, truncate, slightly depressed; style stays on late; rudiment small.

Hull: Outer surface green, turning yellowish green and finally to dark grayish brown when dehiscing; pubescence abundant, short, fine, gray, felty. Inner surface light green, changing rapidly to dark brown. Dehisces on ventral edge only. Edges of hull rolls in along apex; one side of hull usually drying and curling faster than the other. Hull frequently cracks somewhat at various parts of the base. Ripening date, last of August and early September.

Hulled nut.—(Pl. XV, *D.*) Size varies much, tends to run rather small ($1\frac{1}{8}$ by $\frac{3}{4}$ by $\frac{1}{2}$ to $1\frac{3}{8}$ by 1 by $\frac{5}{8}$ inches); average small ($1\frac{1}{8}$ by $\frac{7}{8}$ by $\frac{9}{16}$ inches). Number of nuts to the pound, 200 to 300. Percentage of kernel to nut in hand-cracked samples, 45.

Shape: Varies much in plumpness, inclined to be flat; generally wide ovate, with part on ventral side of axis somewhat cordate (edgewise view, ovate with thin apex as a rule). Ventral edge much curved and longer than dorsal; wing thin, prominent to medium prominent, being most prominent near apex, but distinct clear to stem scar. Dorsal edge plump, gently curved, with tendency to be straight in middle, curves abruptly near apex. Base medium plump, varies in width, usually wide, dorsally sloping; ventral shoulder higher than dorsal and round; dorsal shoulder short and sloping; stem scar narrow, long, depressed, sharply sloping dorsally. Apex varies, usually thin, generally tapering slightly. Extreme apex acutely rounded.

Shell: Color dark to light reddish brown, usually dark; varies much in hardness; sometimes so soft as to be crumbly; sometimes somewhat hard and bony, especially when soil moisture is lacking in growing season. Frequently part of hull is left on the shell, giving a light-yellow flaky covering. Outer shell frequently knocked off in hulling. Pits variable in number, generally rather few, round, large, deep. Surface between pits stippled. Outer shell usually thin and has a tendency to be somewhat brittle, although many times smooth and hard. Canals moderately numerous, oval or round. Network moderately coarse. Fibers large. Inner shell thin, hard; surface undulating, yellowish brown in color, lighter in color than outer surface. Ventral streak very large, narrow, with long pointed apex and long pointed base.

Kernel: Few doubles (1 per cent). Fills shell cavity fairly well. Rather small but variable (average $\frac{7}{8}$ by $\frac{1}{2}$ by $\frac{1}{4}$ inch). Inclined to be plump at base, wrinkles upon drying. Ovoid. Tapers from base downward. Dorsal edge plump, slightly longer than ventral. Both dorsal and ventral edges slightly curved. Dorsal shoulder sloping; ventral rounding. Apex varies in thickness, cuneiform. Pellicle rather tough, dark brown, with moderate amount of coarse pubescence; base scar very large, oval, dark brown; pellicle fold small and rather short.

Distinguishing characteristics.—The following combination of characteristics should be noted as of special use in distinguishing this variety from others: Base dorsally sloping; pronounced thin wing, especially near apex; round, thin, tapering apex; shell soft; very long and rather narrow dark-brown ventral streak with long pointed apex; kernel ovoid with cuneiform apex, pellicle dark brown and heavily pubescent.

COMMENTS

The variation in shell and kernel, heavy pubescence of kernel, and the tendency of the nut to run to small sizes and to vary in size are serious disadvantages. Although much better than some of the poorer varieties, it is on the whole quite inferior to the better varieties and should not be planted extensively.

75. WASHINGTON

Origin.—Grown at one time in southern Utah. A small, plump, hard-shell nut of little merit.

Description

Hulled nut.—Size small to medium (average, $1\frac{1}{4}$ by 1 by $\frac{13}{16}$ inches).

Shape: On ventral side of axis wide cordate; on dorsal side long elliptical (viewed edgewise, wide ovate). Ventral edge much curved; ventral flange and wing very thick and prominent; usually wing has two very deep grooves parallel with it on each side which frequently are so deep that ridge appears to be made up of three flanges, the middle and highest one being the wing. Dorsal edge slightly curved, edge rather wide and pronounced. Base very much dorsally sloping and plump, stem scar medium to large, oval. Apex plump, very blunt and round.

Shell: Very hard, yellowish brown in color. Pits numerous, varying in size, deep.

Kernel: Size medium (average, $\frac{7}{8}$ by $\frac{5}{8}$ by $\frac{5}{16}$ inch). Many doubles; shape short, wide, somewhat flat; base broad and round; ventral shoulder sharply rounding; dorsal shoulders slightly sloping. Pellicle dark brown; pubescence abundant, moderately long, coarse.

Distinguishing characteristics.—Very hard shell, with numerous deep pits varying in size. Base sloping dorsally very much. Apex very broad and round. Nut nearly as wide as long. Ventral ridge very heavy and prominent except at apex. Two deep grooves frequently divide the ridge into three flanges running the entire length of ventral edge, the most prominent one being the wing.

NOTE.—This nut somewhat resembles in shape the Bidwell, Garwood, and Tarragona. The Washington nut, however, is much smaller, more rectangular, and with the apex more truncate than in any of these varieties.

76. WHITE FLAT (BIG WHITE FLAT)

Origin.—Uncertain. At the present time the variety is grown only to a very limited extent. Trees of the White Flat are found in several orchards in the Davis and Winters district. The nut resembles the Ne Plus Ultra.

Description

TREE

Rather a slower grower, spreading (ratio of height of head to width, $1:1\frac{1}{3}$). Trunk slow grower; bark medium rough, cracks close together, exfoliates in medium thick flakes.

Main branches.—Medium in length and stockiness. Branching angle wide. Wood brittle. Bark rough and cracked on old branches, dark brown, light brown on younger branches, gray epidermis common; light-gray striations common on young branches.

Twigs.—Medium in length and diameter. Branching angle wide. Nodes rather large. Internodes medium in length ($\frac{3}{8}$ to $1\frac{3}{4}$ inches). Bark medium deep green, tinged with red in fall.

Lenticels.—Numerous, small (size on bark 8 to 10 years old, $\frac{1}{32}$ by $\frac{3}{16}$ to $\frac{3}{32}$ by $\frac{3}{16}$ inch), gray, slightly raised, rather rough on surface, elliptical, wide, short, sides curving, ends acute. On twigs lenticels medium in size, numerous, round, grayish, conspicuous.

Foliage.—Average density. Leaves on individual branches slightly below average in number, large, tend to remain flat. (See Pl. XXIII, *B.*)

Blade: Large ($\frac{3}{4}$ by $3\frac{1}{4}$ to $1\frac{3}{4}$ by 6 inches; average, 1 by 4 inches). Width varies, averages narrow (ratio of width to length, 1:4). Shape long ovate, with apex half tapering. Base usually acute; origin of margins generally symmetrical. Apex tapering, acute. Margins deeply and shortly crenate. Midrib slender, medium in prominence. Veins distinct, usually elevated on lower surface. Upper surface of blade medium dull green, very slightly yellowish in strong light. Lower surface light, dull, green.

Petiole: Slender, rather short (average 1 inch; ratio of length of petiole to length of blade, 1:4). Lower surface light yellowish green. Upper surface bright light green. Groove narrow; deep except at base, where it is very shallow; slightly tinged with red in fall. Glands two to seven, commonly four, medium to large, globular or oval, frequently protruding, grayish yellow or brownish yellow; occasionally slightly stipulate.

Bearing habit.—Averages light crops. Most of nuts on wood 2 and 3 years old; many in clusters on spurs on 2-year-old wood; some on wood 4 or 5 years old, a few on laterals. Some spurs compound and long ($\frac{1}{4}$ to 1 inch). Occasionally spurs live two years. Single spurs rather long ($\frac{1}{4}$ to $\frac{3}{8}$ inch); slender ($\frac{1}{8}$ inch); expands gradually to nearly round disk about $\frac{1}{4}$ inch in diameter. Buds free, long, pointed; scales dark brown, thin, tough, with medium amount of long, gray pubescence on edges.

NUT

Immature nut.—Quite large (2 by $1\frac{3}{8}$ by 1 inches). Shape flat, irregular, ovate or obovate, varying on same tree. Ventral edge much and regularly curved; one side frequently higher than the other. Suture depression narrow ($\frac{1}{32}$ inch), very shallow ($\frac{1}{64}$ inch), often a mere line. Dorsal edge less curved than ventral; curved suddenly near apex. Base tapering, with dorsal edge dropping off abruptly and straight; cavity narrow ($\frac{1}{4}$ inch), shallow ($\frac{1}{64}$ inch). Apex pointed, usually cuneiform.

Hull: Outer surface green; pubescence medium in amount and length, fine, gray; style usually drops early; rudiment small. Inner surface pale green, turning during dehiscence to brown. Dehisces on ventral edge; dorsal edge usually cracks somewhat, and sometimes the halves of hull completely separate; ventral edges of hull curve in at apex and outward at base. Many gummy nuts are produced. Ripens August 15 to September 15.

Hulled nut.—(Pl. XV, *E.*) Size quite large ($1\frac{5}{8}$ by $\frac{13}{16}$ by $\frac{1}{2}$ inches). Number of nuts to the pound, 170 to 200. Percentage of kernel to nut in hand-cracked samples, 40.

Shape: Somewhat flat, long, tapering at ends. Dorsal edge straight or very gently curved, with rather prominent, narrow, dorsal ridge. Ventral edge gently curved; wing thin, prominent, gradually increasing in prominence from base to apex. Dorsal edge straight or very gently curved, with rather prominent, narrow, dorsal ridge. Base tapering, constricted in all directions; dorsal shoulder drops off exceedingly abruptly from edge of stem scar; ventral shoulder very sloping and has wing running clear to edge of stem scar; the prominence of the wing decreases as it approaches stem scar; stem scar small, wide oval, much depressed; at right angles to axis or slightly sloping either ventrally or dorsally. Apex long, pointed; varies in sharpness; extreme ends thin, short, pointed wing; ventral edge curves evenly; dorsal edge curves inward near apex, giving apex recurved appearance. Viewed edgewise, apex is tapering.

Shell: Soft, thin; frequently splits open along ventral edge next to wing; outer surface light brownish yellow; has tendency to flake off and to adhere to hull. Pits few, large, oval or irregular, shallow. Surface between pits slightly undulating, but of rather firm texture. Outer shell very thin. Canals small, short; long oval. Fibers rather fine. Inner shell very thin, but hard. Inner surface undulating; dark sepia brown, much darker than outer surface. Ventral streak yellowish brown, variable in length, usually wide, tapering at apex.

Kernel: Few doubles; size average medium (1⅛ by ½ by ¼ inches). Shape rather thin, long; wrinkles much in drying, oval. Ventral edge shorter than dorsal, curving gradually from middle to base and apex, giving kernel a tapering appearance at both ends. Dorsal edge straight, rounding suddenly at dorsal shoulder, curved slightly at apex. Dorsal shoulder very sharply rounding and thinner than ventral and elevated much above ventral shoulder. Ventral shoulder very sloping with base scar well down upon it. Apex generally rather thin, with very slightly recurved appearance. Pellicle dark brown, tough, thick; pubescence heavy, very abundant at apex, gradually decreasing from apex to base, which is rather smooth; pellicle fold medium prominent throughout apex third of ventral edge; veins small but distinct; base scar dark brown, large, oval, and well down on slope of dorsal shoulder. Flavor slightly sweet, flat, inferior.

COMMENTS

This variety is a shy bearer and has a tendency to produce many gummy nuts. It has no special merit and fortunately is not grown extensively.

ALMOND VARIETIES NOT WELL KNOWN OR NOT GROWN COMMERCIALLY IN THE UNITED STATES[12]

77. **Acampo Texas** (Pl. XV, *A*). Said to have originated near Acampo, Calif., from a seed of a Texas almond tree. The variety has been distributed to some extent in the interior valleys of California, where it is usually thought to be the true Texas. The nut resembles the Texas almond in all respects with the exception that the shell is usually lighter in color and varies more in hardness than in the Texas, and the nut tends to run somewhat smaller on trees of the same age than in the true Texas. Some growers speak of this almond as the " Small Texas." Like the true Texas, the variety bears well, blossoms late, and is a good pollinizer of other varieties blooming at the same period. The defects of this nut are the same as of the Texas. This variety should not be confused with Soft-Shell Texas (see 146).

Albruzzi. See BARI (84).

78. **Algeria.** This almond, bearing a rather small, ovate hard-shell nut, grows wild in the mountains of Algeria at an altitude of about 3,000 feet. It is said to be robust and very resistant to drought. The Office of Foreign Seed and Plant Introduction, United States Department of Agriculture, obtained seeds of this almond from Dr. L. Trabut, Algiers, Algeria, in 1910, and trees from these seeds are now growing in the Government Plant Introduction Garden at Chico, Calif. This almond has no promise as a commercial variety, but has qualities that may prove valuable when it is used as a stock under conditions requiring a root resistant to drought.

79. **Alicante.** This Spanish almond, possessing large kernels of good quality, is imported into the United States, but is not grown here. The term " Alicante " is also commonly applied in Spain to a number of Spanish varieties.

Almendro del Desmayo. See DESMAYO (100).

Almendro del Esperanza. See ESPERANZA (103).

80. **Ardales.** This term is applied to large flat almonds of the Jordan type grown in Spain.

81. **Arizona** (*Arizona Prolific*). A large hard-shell variety. At one time grown to some extent near Mesa and Phoenix, Ariz.

82. **Astachan** (*Astachan badam*). A variety cultivated near Khokand, Russian Turkestan, where the small, long, oval, and somewhat pointed nut is considered excellent. Seeds of the variety were introduced by Frank N. Meyer, of the Office of Foreign Seed and Plant Introduction, United States Department of Agriculture, in 1911 and planted at Chico. From the resulting seedling trees nursery trees were propagated and distributed to a considerable extent over California and other States. This almond has no commercial value, but may be of value as a stock where alkali-resistant roots are desired.

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[12] This list is not intended to be complete.

83. **Avellanda.** This name is applied commercially to short, plump almonds shipped from Spain. It appears to be used both as a variety name and as a general name applicable to almonds having more or less globular shapes.

84. **Bari** (*Albruzzi*). Grown in Italy. Imported into the United States to some extent, but not grown in this country.

85. **Blancal.** A variety grown in Spain.

86. **Bonita.** This variety is thought to have originated in southern Portugal. The nut is medium in size, rather plump, hard shell, dark brown, elliptical or oval, dorsal edge not so sharply curved as ventral; ventral flange thick, but not pronounced, base scar slightly dorsally sloping, apex round, surface of shell is covered with large, irregular-shaped pits taking the form of grooves at the apex. At one time trees of this variety were planted in California, but so far as known none exist at the present time.

87. **Brandis** (*Brandis's Jordan*). A variety grown for a long time in Australia, where it is reported to be an erratic bearer. It is thought to have originated from a seed of the true Jordan.

88. **Brier** (*Brier's Languedoc*). A California variety originated by W. W. Brier, of Centerville, Calif. So far as can be learned the variety was never popular. It is now difficult to find authentic trees of the variety.

89. **Burbank** (*Burbank's New*). Originated at Santa Rosa, Calif., by Luther Burbank. The nut is a very dark brown, hard-shelled almond resembling the Rock Jordan, but is wider. The kernel is somewhat inferior to the Jordan. Trees of the variety were distributed to Australia and other countries as well in the United States. A few trees are still growing in California, but the variety is of little consequence.

90. **Burcea Tenera.** This variety probably originated near Niles, Calif. It was never widely planted, and it is now difficult to find trees of the variety.

91. **California Princess.** This name is applied locally in California to some seedling soft-shelled almonds, as well as to the true Princess.

92. **Canary.** A name applied to short, plump almonds grown in the Canary Islands.

93. **Castillet.** A variety grown to a limited extent in Spain.

94. **Chellaston.** A variety originating in Australia.

95. **Comun.** A Spanish variety, exported from Spain as a shelled nut.

96. **Cope** (*Cope's Seedling*). A large, long almond with a very hard shell resembling somewhat the Rock Jordan in shape. The variety was grown at one time in California. Not grown at present.

97. **Corriente.** Applied to various inferior Spanish almonds. The name seems to refer to a class of almonds rather than to a single variety. At any rate, almonds of various sizes and shapes are sold as "Corrientas."

Cortas. A name applied to Valencia almonds to distinguish them from "Larga" or Jordans. See VALENCIA (149).

98. **Dayton.** A variety recently grown in the State of Washington. According to many it was thought to be a new name for a variety whose true name had been forgotten. It is no longer grown.

99. **Della Rayina** (*Della Regina*). A California variety thought by some to have originated at Niles, Calif. The variety was never widely planted and is not grown at the present time.

100. **Desmayo** (*Almendro del Desmayo*). This variety of bitter almond was obtained from Pedro Giraud, of Spain, by Walter T. Swingle, Office of Foreign Seed and Plant Introduction, United States Department of Agriculture, and was first planted in the Government gardens at Chico, Calif. Trees were propagated and distributed in California and other States. The variety appears to be quite frost resistant, but is of interest only to plant breeders.

101. **Dickenson.** A short, flat nut originating near Davis, Calif. On account of its variation in size and bearing habit, the variety soon became unpopular. It is no longer grown.

Dona Virtudes. See GRANADA (108).

102. **Early Jordan.** A very soft-shelled Australian almond.

103. **Esperanza.** A Spanish variety of almond exported from Spain in the form of shelled nuts, i. e., kernels. This variety was introduced into the United States by Walter T. Swingle, United States Department of Agriculture, and planted at the Chico (Calif.) garden. As a result of its being widely distributed a few trees of the variety are found in most of the California localities. The shape of the nut somewhat resembles that of the Malaguena Jordan, but it is smaller and not so pointed.

104. **Fabrica.** A variety of almond grown to a limited extent in Spain.

105. **Falanigensa.** A term applied in Spain to a rather small, long almond.

106. **Formigueta.** This name has been used to refer to various types of Spanish almonds sold in the shell. It appears to be interchangeable with the word "Nolla" as a variety name and like the term "Mollar" is used to designate several soft-shelled varieties.

French Languedoc. A local name in California for a variety of almond grown there now known to be the Cartagena (11).

French Paper-Shell. The almond distributed in California under this name is identical with the Princess (57).

107. **Gapin.** A variety once grown in the South Atlantic States, thought to have originated in California.

108. **Granada** (*Dona Virtudes*). Applied to the long types of Jordan almonds grown in Spain.

109. **Gray.** Originated in Washington County, Utah. The nut is a large, soft-shelled almond. Trees of the variety were planted in Utah and Nevada.

110. **Hardshell.** In California the term "Hardshell" is used commercially as a class name to designate numerous seedling almonds which have not been named as varieties, and it is also applied to any named variety having a hard shell.

111. **Harput.** This almond grows on the lowlands of the Euphrates River, as well as in the high table-lands in Turkey. The nuts are hard-shelled, ovate, medium sized, and inferior to the commercial varieties grown in this country. Harput almond nuts obtained by the United States Department of Agriculture and planted at Chico produced trees varying in nature, some bearing sweet and some bitter nuts, of interest only to plant breeders or botanists.

Hatch varieties. Commonly used to designate collectively the three varieties produced by Mr. Hatch, and now so common in California, viz: Nonpareil, I. X. L., and Ne Plus Ultra. (See descriptions of these varieties.)

112. **Hawthorn** (*Hawthorn Seedling*). An Australian almond.

113. **Hindustan** (*Hindustan badam*). A wild type of almond found in northern India and much used by the inhabitants of Chinese Turkestan for medicinal purposes. The nut is very small, resembles a peach, and is slightly bitter. Frank N. Meyer, of the Office of Foreign Seed and Plant Introduction, United States Department of Agriculture, secured seeds of this almond, which when planted at the Government garden at Chico, Calif., produced large trees of various types. During the period from 1913 to 1916 a number of nursery trees, propagated from the trees of the garden, were distributed in California and various other States. It is not uncommon to find trees of the variety in California. This almond may prove useful as a hardy stock, but the nut, of course, is of no value commercially.

114. **Imperial.** A variety originated and grown in Australia.

Improved Languedoc. The variety sold in California under this name is the Grosse Tendre (32).

115. **Inca.** A Spanish type of inferior quality. The name frequently appears to be applied synonymous with Corriente.

116. **Japan Soft-shell.** An almond at one time recognized as a variety in Louisiana.

117. **Kasan** (*Kasan badam*). A large thin-shelled almond, native of Russian Turkestan. Seeds were introduced through Frank N. Meyer, of the Office of Foreign Seed and Plant Introduction, United States Department of Agriculture, and planted at the Chico garden. Nursery trees from these seedlings were propagated and distributed to a limited extent in California and other States. An occasional tree is still to be found in California. Of no use commercially, but of possible value for experimenting in the production of alkali-resistant stocks.

118. **Khandak** (*Khandak badam*). Applied to several types of small almonds of various shapes found in Russian Turkestan, varying from soft to hard shelled. Introduced in the same manner as the preceding. Trees resulting from the planting of the introduced nuts are found at Chico. From these, nursery trees were propagated and distributed quite widely. In California some of these trees are still left. Of value only in rootstock experiments.

119. **Khotan** (*Tash badam*). Seeds of this almond were introduced from Russian Turkestan and planted at the Chico garden, as in the preceding. The almond is a small, hard-shelled, medium-sized, long ovate nut tapering at the apex. Nursery stock propagated from the seedling trees at Chico were distributed in California and other States. Of value only in rootstock experiments.

120. **Kimball.** Originated in California in the early nineties. It is known that the variety was advertised and planted in Georgia at one time. Trees of the variety can no longer be located in California.

Ladies Thin-Shell. Trees sold in California under this name from 1888 to 1900 were really the Princess variety (57).

Larga. A term applied to Jordan almonds in Spain to distinguish them from the Valencia types.

121. **Larguetta.** A type of almond grown in Spain and Italy. Usually exported in the shelled form.

122. **La Virkin.** Grown at one time in southern Utah. An inferior, large, flat, oval, dark-colored, hard-shell nut with a truncate, dorsally sloping base and blunt apex.

123. **Mallorca.** A Spanish almond.

124. **Marcona.** This name appears to be applied rather loosely to types of Jordan almonds from Spain.

125. **McCoy.** This variety, which originated in the Gordon Valley, Calif., is a regular and heavy bearer, but habitually produced so many sticktights that it soon became unpopular.

126. **Medina.** Originated in Medina County, Tex. It is claimed by nursery companies there to be one of the few varieties of almonds that will bear in the Texas climate.

127. **Mollar.** This name appears to designate a particular variety grown in Spain and also is used there as a general name for soft-shelled varieties. It is often applied to the Tarragona.

128. **Neer** (*Neer's Prolific*). A large, soft-shelled almond originated by F. L. Neer, of Pennington, Calif. No trees of the variety are now in existence.

129. **Newhall.** Originated in California. Nursery stock of the variety was propagated and sold in Georgia from 1896 to 1904. No trees of the variety are now found in California.

130. **New Brandis.** An Australian variety.

131. **New Nonpareil.** A variety bearing a rather large almond, originated in Australia.

132. **Nolla.** A Spanish almond exported in the shell. In some cases at least the word "Nolla" is used to refer to the Formigueta almond.

133. **Palatine.** Originated at Santa Rosa, Calif., by Luther Burbank. It is a seedling of the Jordan. Trees of the Palatine are now difficult to find.

134. **Panaret** (*Panalet*). An almond grown in the Balearic Islands.

135. **Pastaneta.** A large, flat, hard-shelled almond, truncate at both apex and base; grown in Spain.

136. **Pinol de Presece.** A variety grown in the Balearic Islands.

137. **Planeja.** A variety grown in Spain.

138. **Planeta.** This name appears to be used in Spain to designate large, flat, hard-shelled almonds of good quality. It seems to be a general name rather than a varietal one. Nuts of both the Jordan and Valencia types are exported from Spain as Planetas.

139. **Pollacks.** An Australian variety.

140. **Pride** (*Pride of the Market*). Originated by Fish & Sons, Stillwater, Calif. This large, smooth, soft-shelled nut of good flavor became unpopular largely because of the large percentage of doubles. It is now difficult to find trees of this variety.

141. **Ramell** (*Ramellet*). A Spanish variety.

142. **Ridenhower.** A hardy, inferior almond with a very hard shell (Pl. XIII, *C*). Originated in Johnson County, Ill. The nut is easily distinguished by its appearance, which closely resembles that of a large peach pit. Of no value except as a curiosity.

Rinds. A term used in Spain to include the Pastaneta, Ardales, and Granada almonds.

143. **Riverside Peerless.** A variety originated and grown in Australia.

144. **Sardina.** An Italian variety of inferior quality.

145. **Simmons.** Originated at some time prior to 1900 by a Doctor Simmons of Sacramento, Calif. The variety was thought to be quite frost resistant and at one time was planted to a considerable extent near Sacramento. Although the nut was of good size and excellent flavor, its hard shell brought it into disfavor. The variety has now practically disappeared, probably largely owing to the fact that because of its supposed resistance to frost it was planted in frosty districts where it proved to be unsuitable.

146. **Soft-Shell Texas** (Pl. XV, *B*). Produced by T. A. Botts, Acampo, Calif. Mr. Botts grafted a number of acres of old I. X. L. trees with scions obtained from the Texas trees grown in the same orchard. The results are of interest chiefly in indicating some effects of stock on scion. The nuts produced in this case differ somewhat in shape from the Texas, have a softer shell, and a longer, flatter, and more pubescent kernel. The kernel does not have the bitter flavor of the Texas kernel. In short, the nut seems to have taken on some of the I. X. L. qualities in minor degree.

147. **Spagon** (*Mandole de Spagon*). A very small almond, less than three-fourths inch in length, of excellent flavor, grown on the island of Corfu, near Greece. It resembles the Pistache almond in shape, but is smaller.

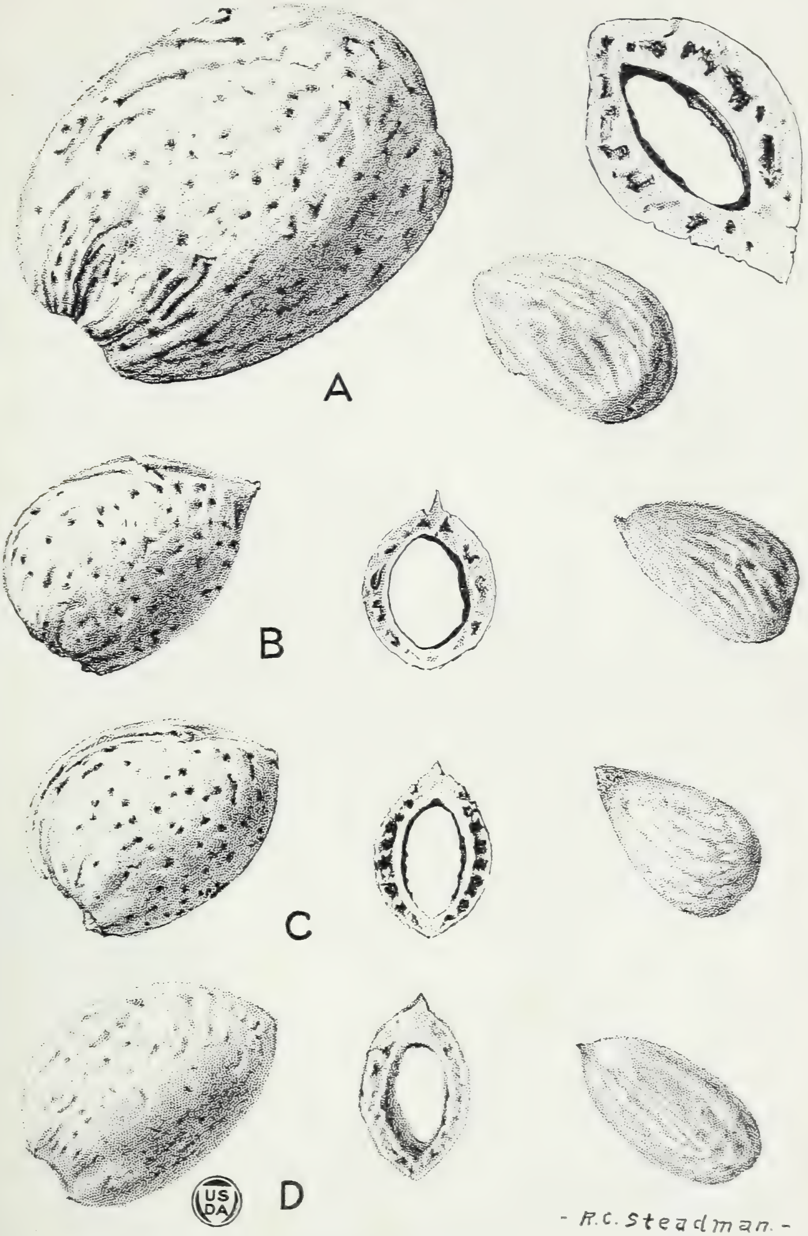
148. **Stuart** (*Stuart's Prolific*). In 1890 J. F. Stuart, of Ripon, Calif., introduced this variety from Texas. The Stuart is thought by many to be the true Texas, while many of the so-called Texas almonds are believed to be seedlings of the Languedoc. The variety was named the Stuart, to distinguish it from the other "Texas" kinds. The Stuart and the Texas sorts all produce heavy crops, and the nuts are very much alike.

Tash (*Tash badam*). See KHOTAN (119).

149. **Valencia.** This name appears to be a class name applied to Spanish hard-shell almonds, several types of which are imported into the United States under the name. In Spain the terms "Valencia" or "Corta" are used to distinguish certain types of nuts from the "Larga" or "Jordan" types.

150. **Victory.** Originated comparatively recently near Chico, Calif. The variety has not become popular and is seldom found.

151. **White Nonpareil.** A variety originated and grown in Australia.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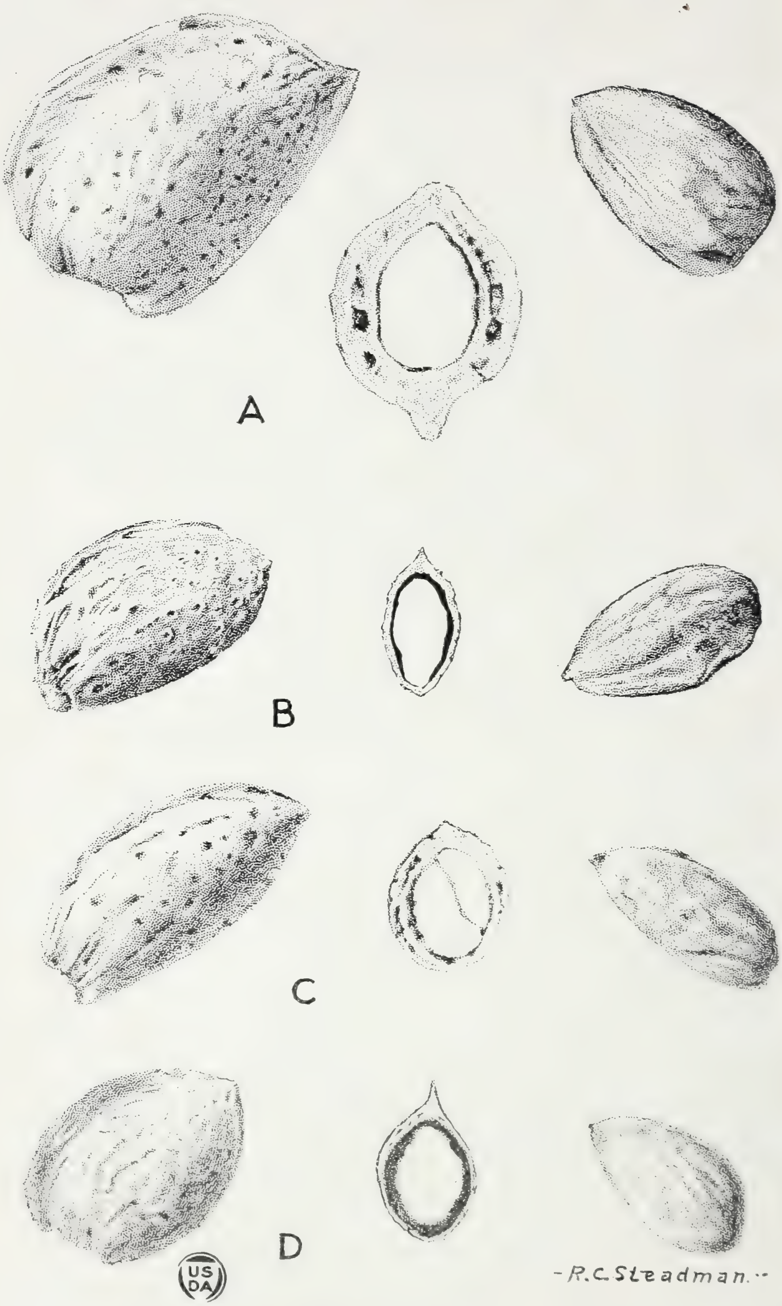
ALMOND VARIETIES.—I

A, Almendro de la P; *B*, Ballard; *C*, Barclay; *D*, Batham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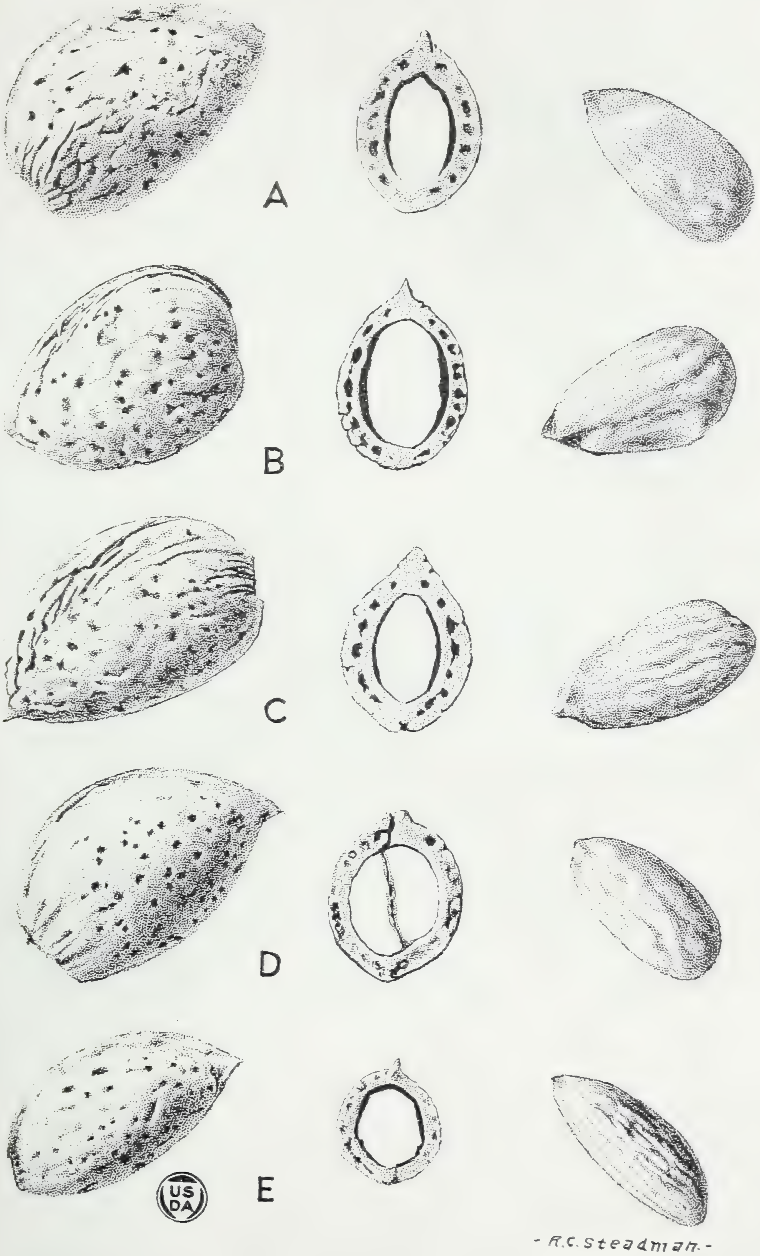
ALMOND VARIETIES.—II

A, Bidwell; *B*, Bigelow; *C*, Brown; *D*, California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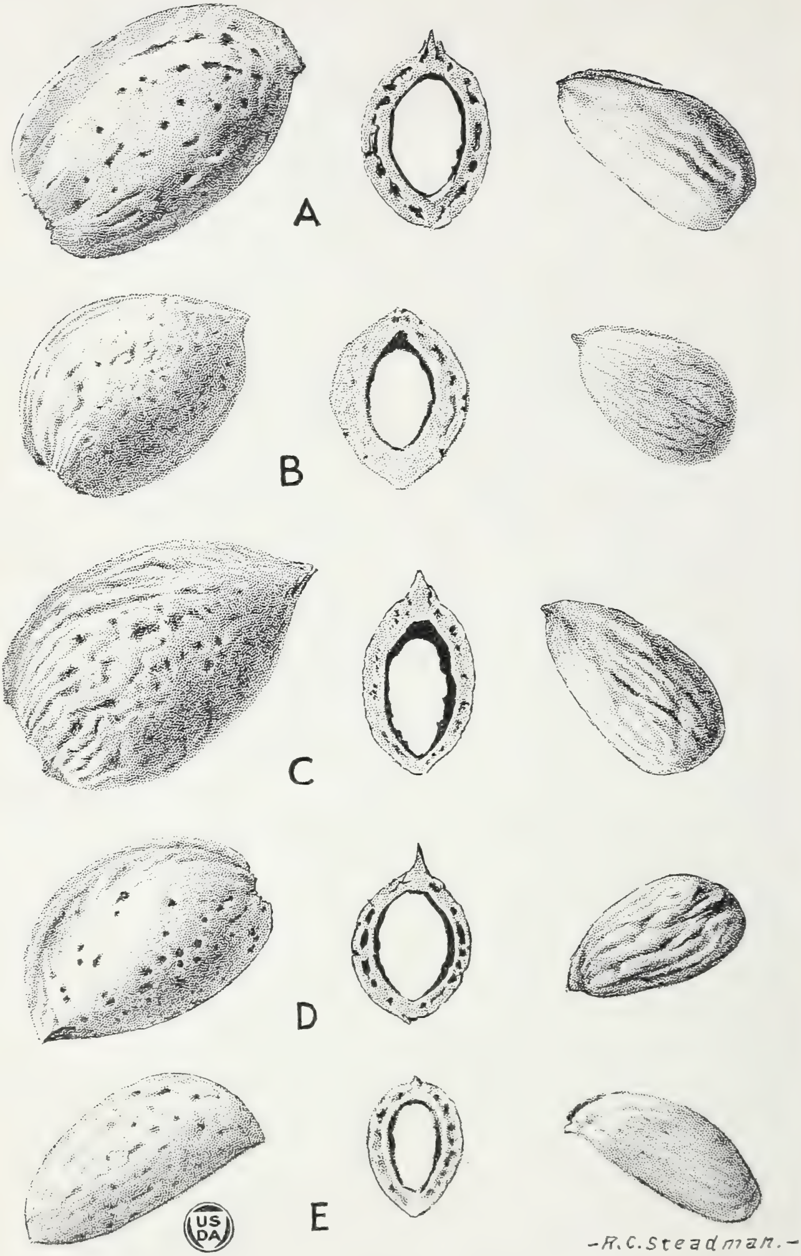
ALMOND VARIETIES.—III

A, Cartagena; *B*, Commercial; *C*, Concord; *D*, Crown; *E*, Cover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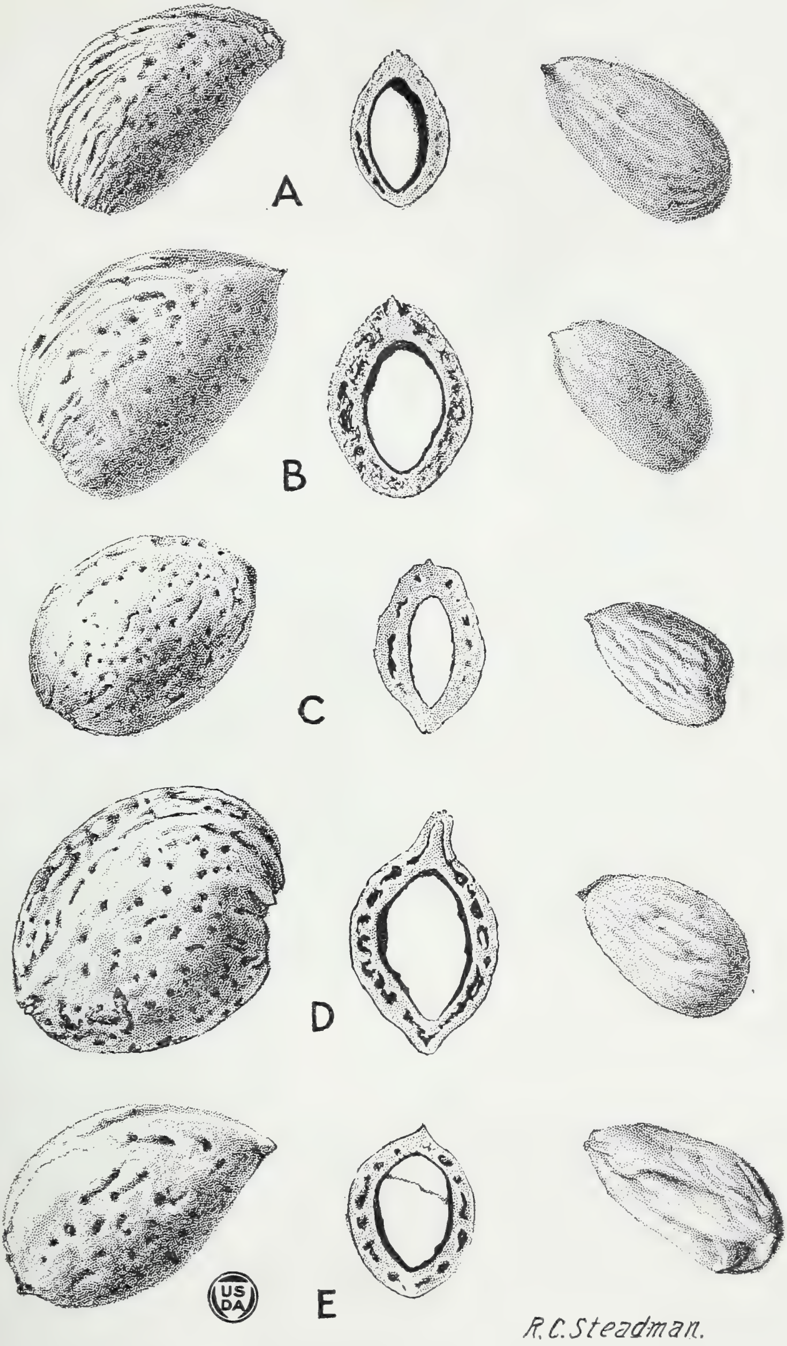
ALMOND VARIETIES.—IV

A, De Witt; *B*, Drake; *C*, El Supremo; *D*, Esparto; *E*, Eureka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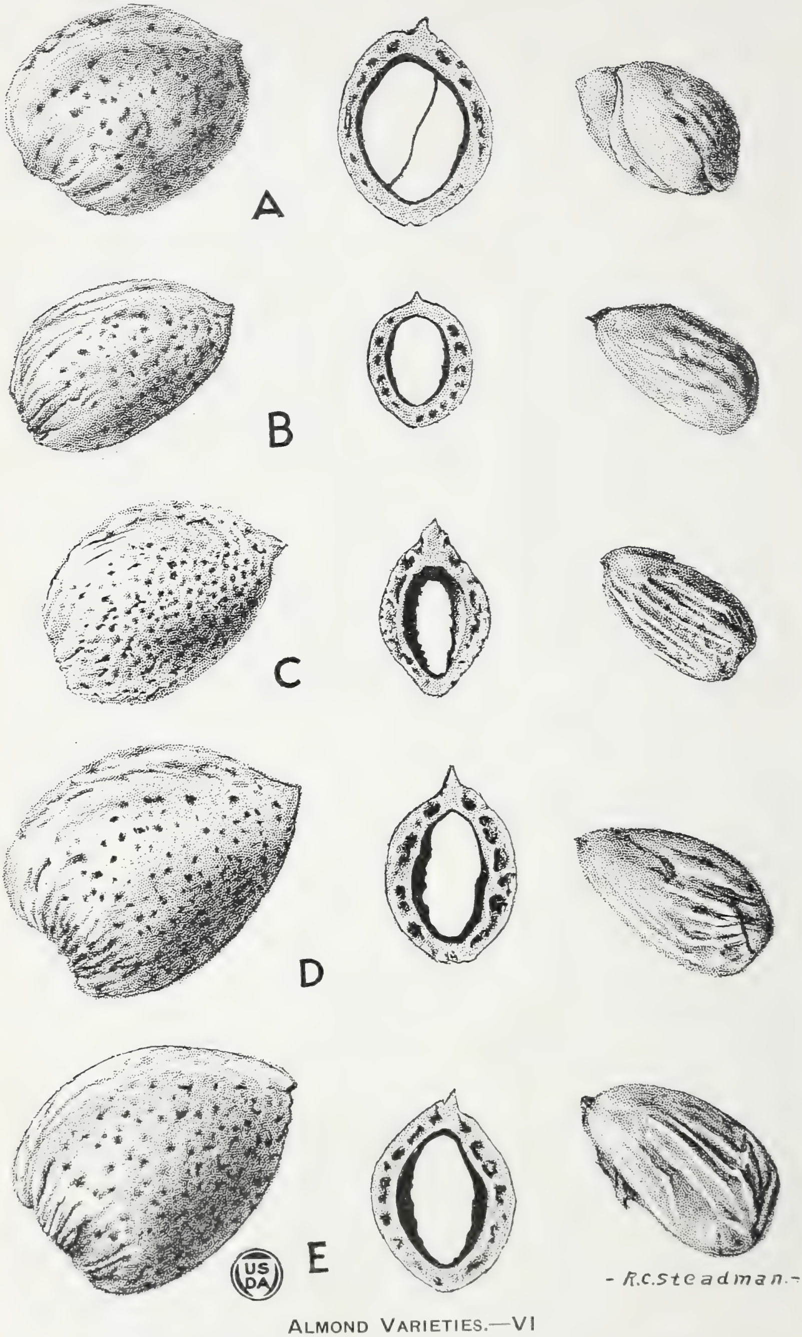
ALMOND VARIETIES.—V

A, Fair; *B*, Fairoaks; *C*, Flint; *D*, Garwood; *E*, Gilt Edge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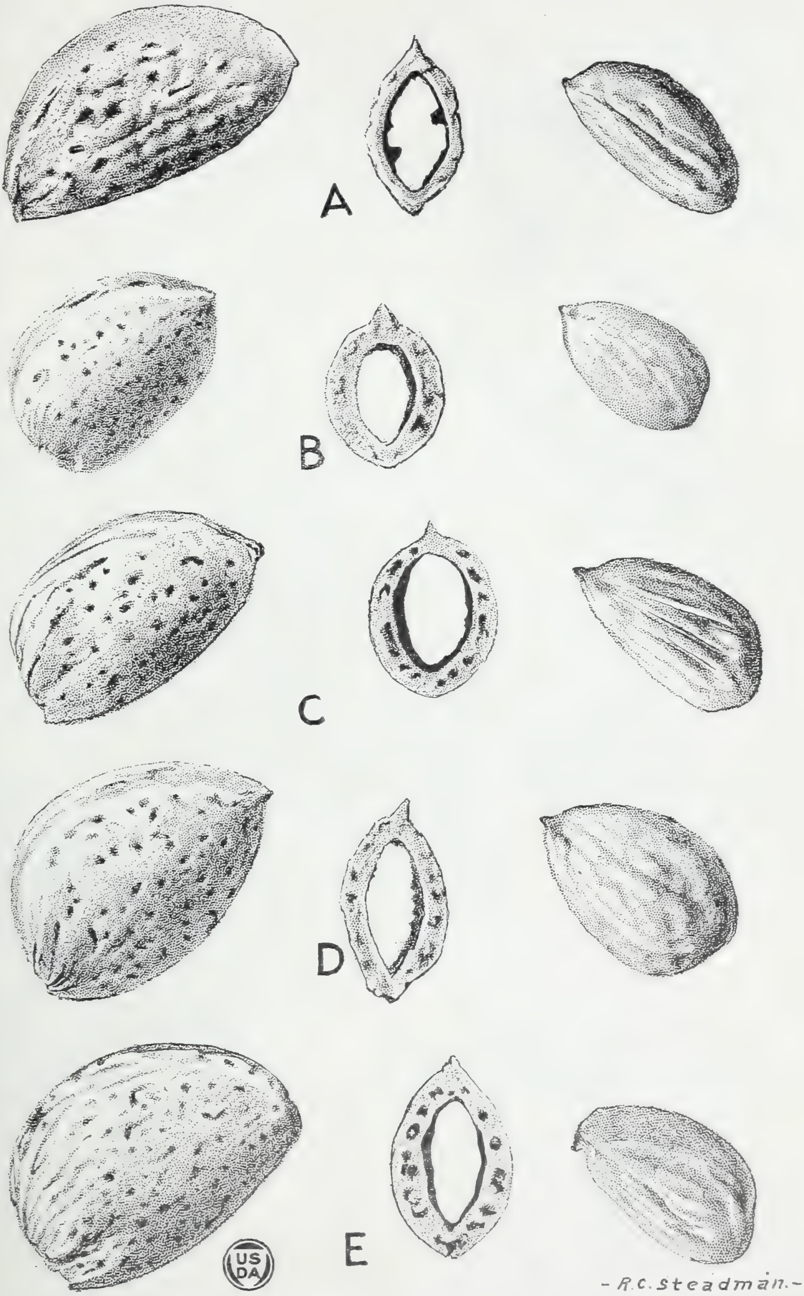
ALMOND VARIETIES.—VI

A, Golden Nugget; *B*, Golden State; *C*, Gordon; *D*, Grosse Tendre; *E*, Hampton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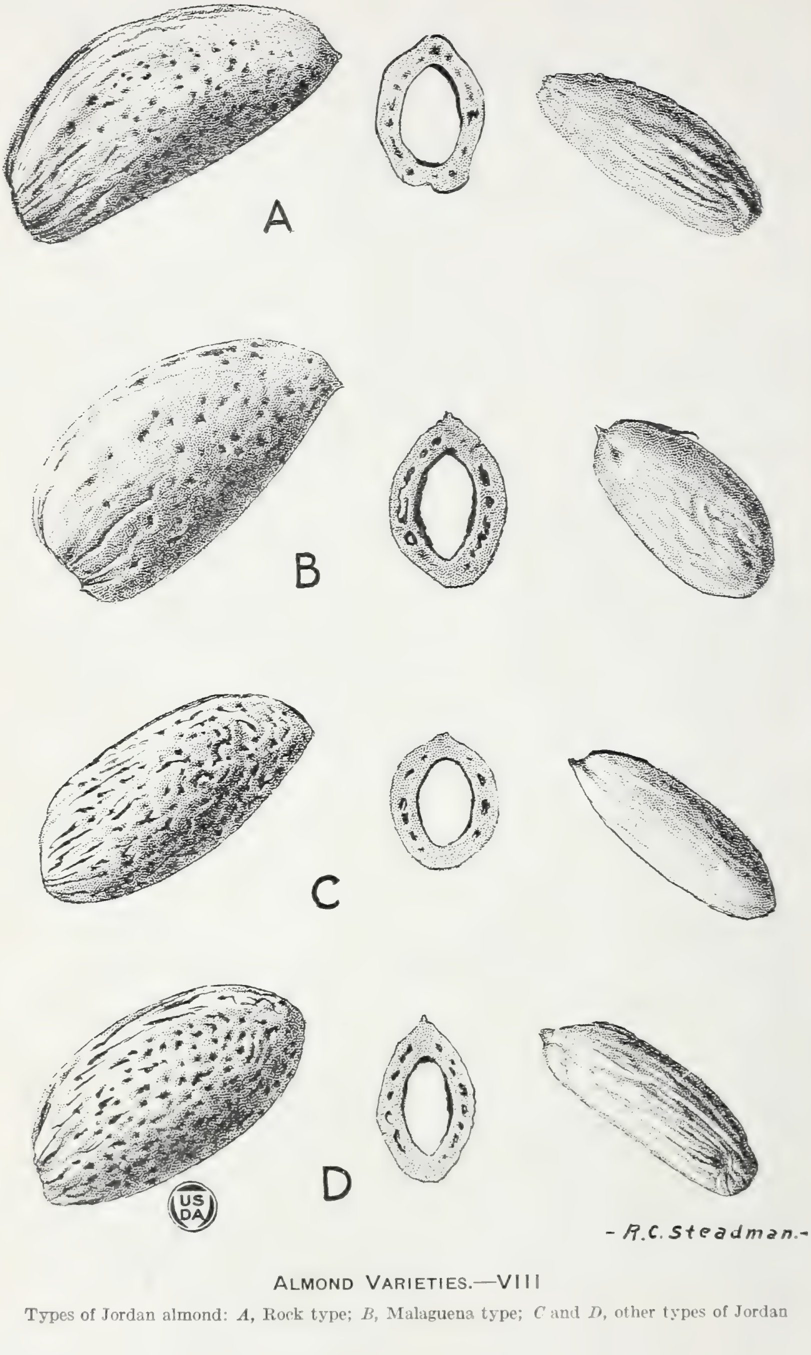
ALMOND VARIETIES.—VII

A, Harriott; *B*, Henle; *C*, Hudson; *D*, I. X. L.; *E*, Ivica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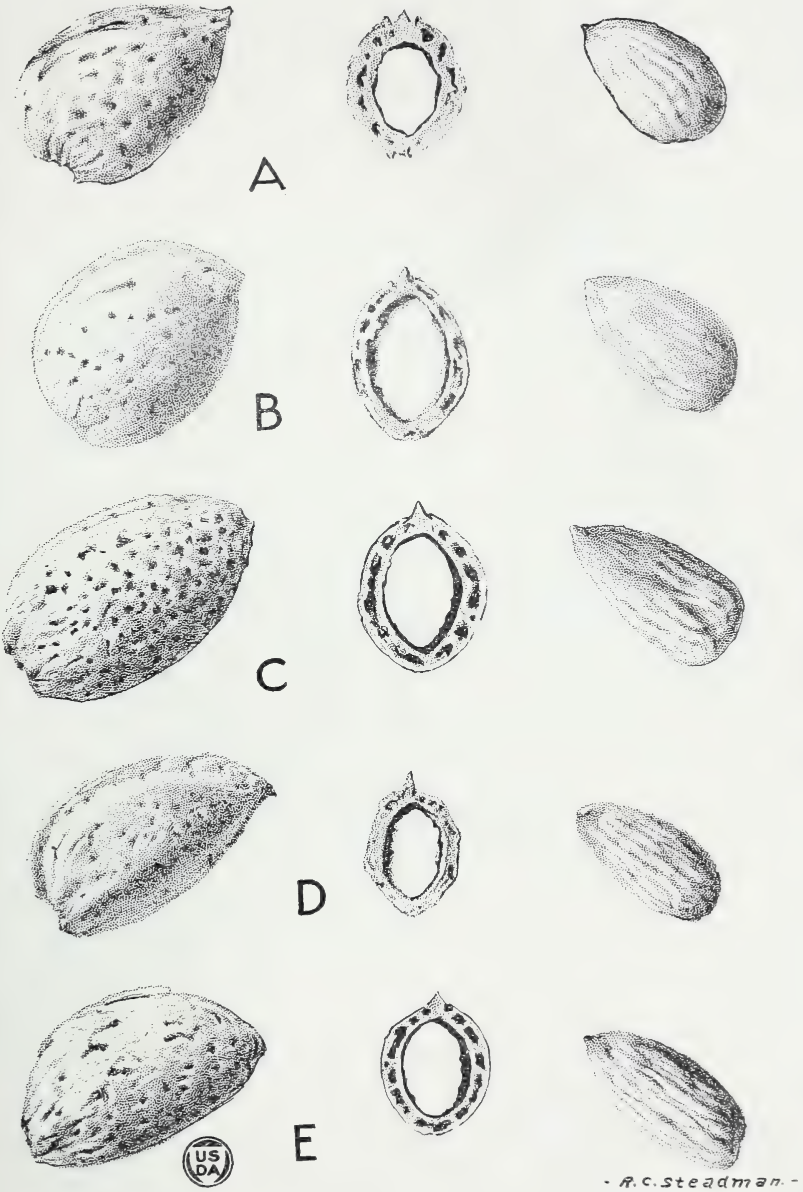
ALMOND VARIETIES.—VIII

Types of Jordan almond: *A*, Rock type; *B*, Malaguena type; *C* and *D*, other types of Jordan

PLATE IX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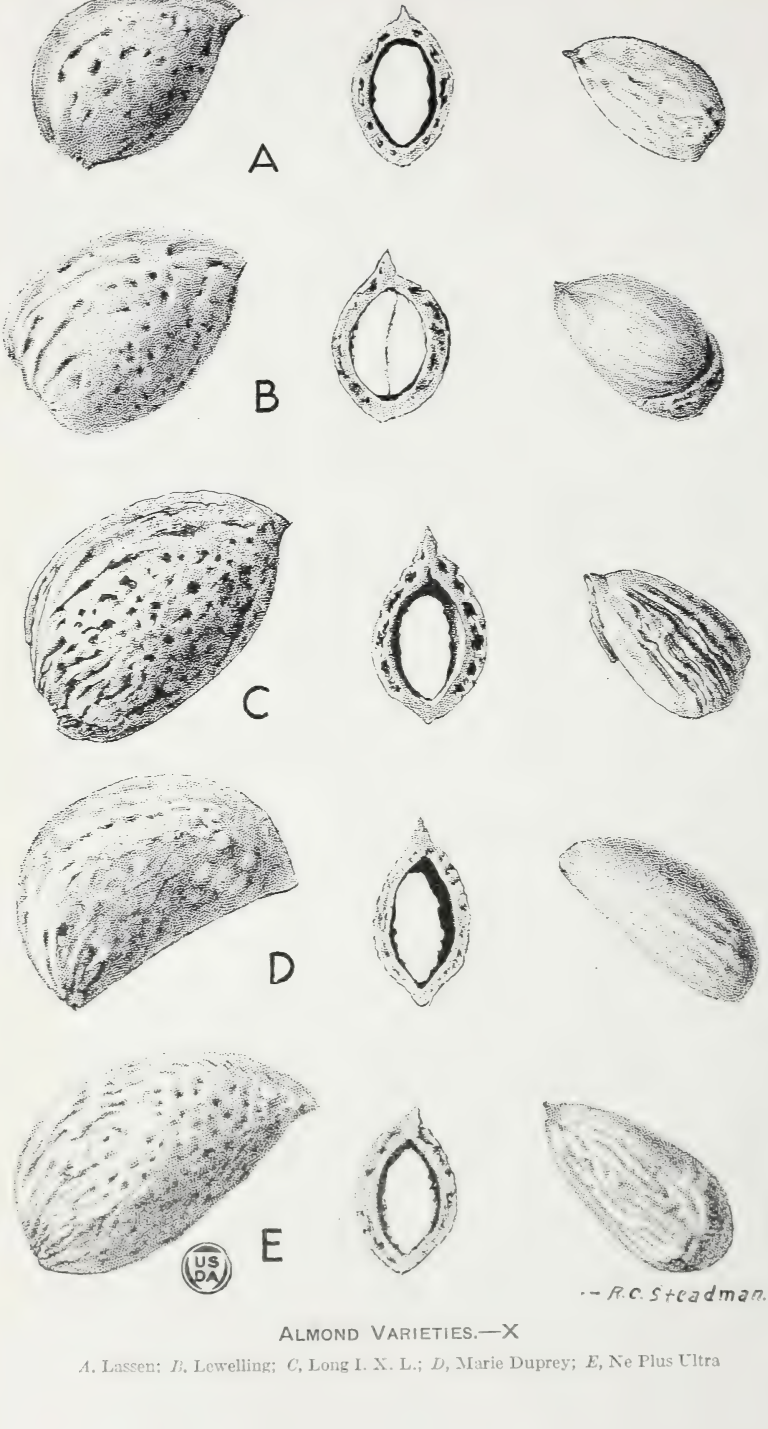
R. C. Steadman

ALMOND VARIETIES.—IX

A, King; *B*, Klondike; *C*, La France; *D*, Languedoc; *E*, La Prima



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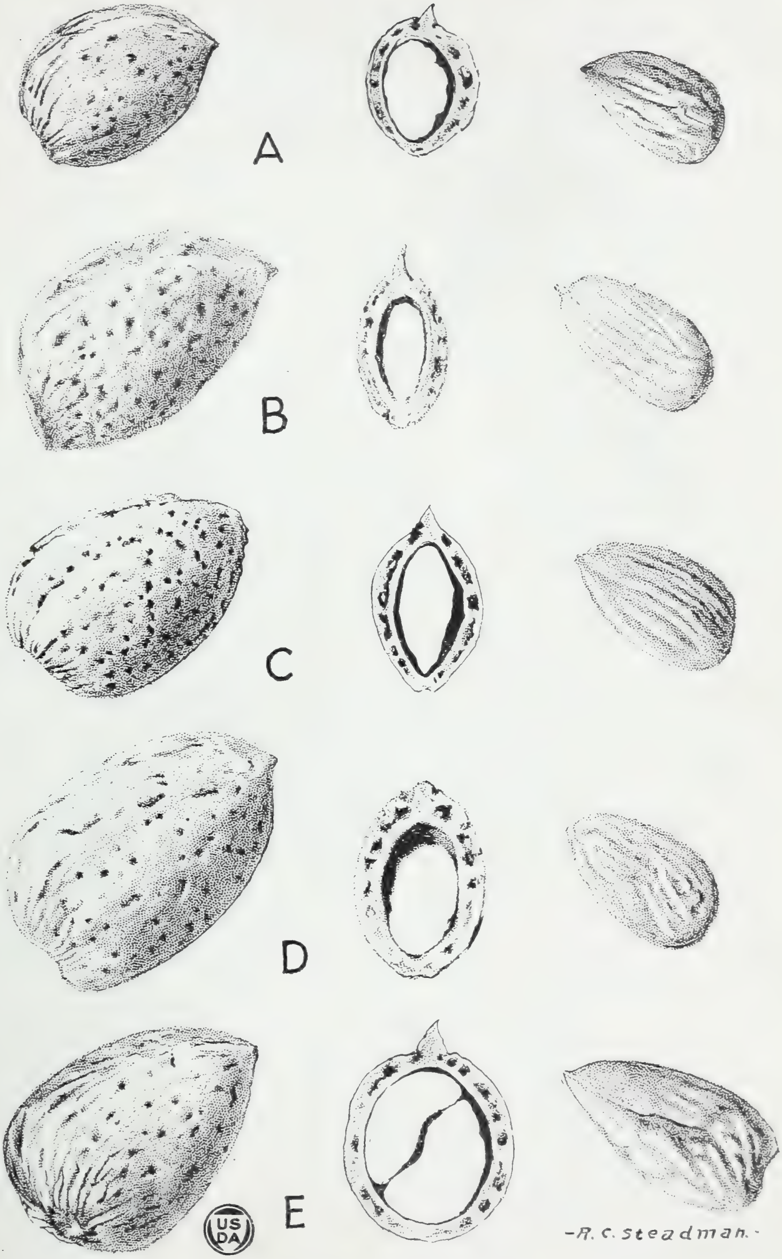
ALMOND VARIETIES.—X

A, Lassen; *B*, Lewelling; *C*, Long I. X. L.; *D*, Marie Duprey; *E*, Ne Plus Ultra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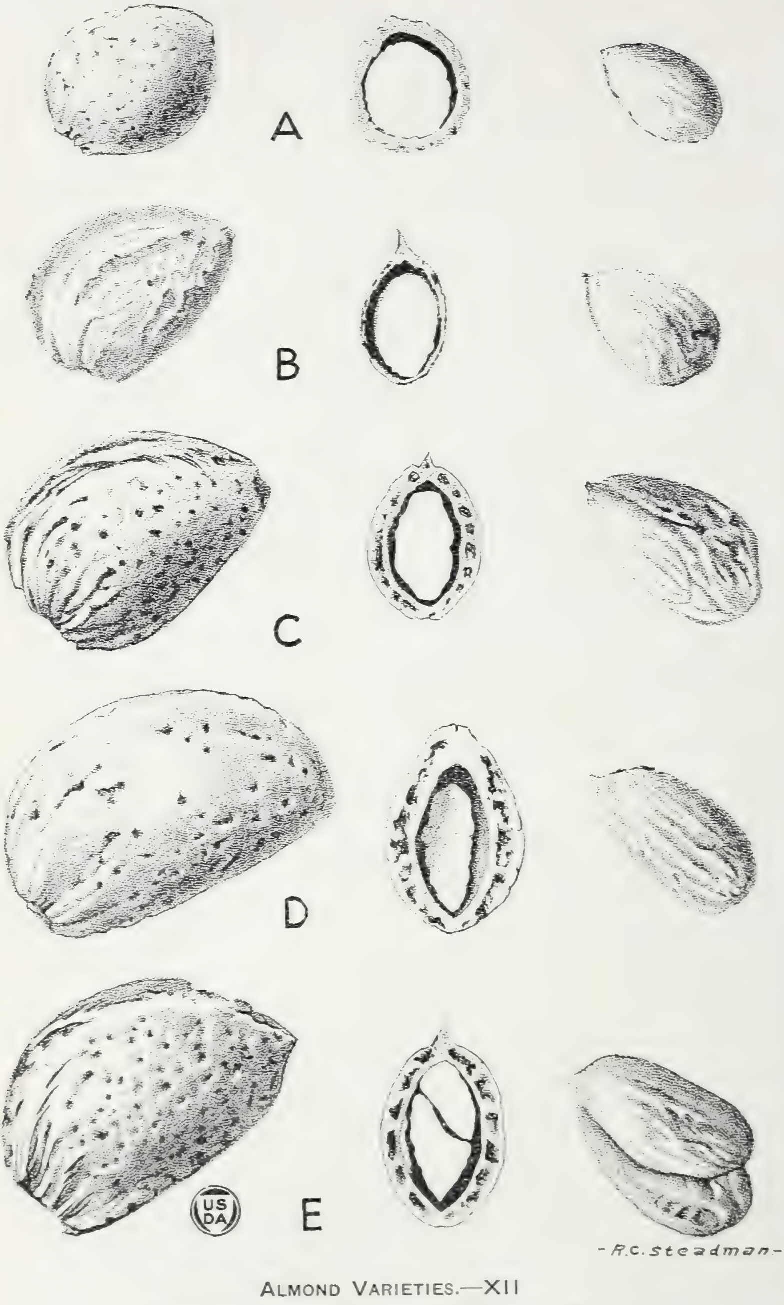
ALMOND VARIETIES.—XI

A, Neverfail; *B*, Nonpareil; *C*, O'Neil; *D*, Peerless; *E*, Philopena

PLATE XII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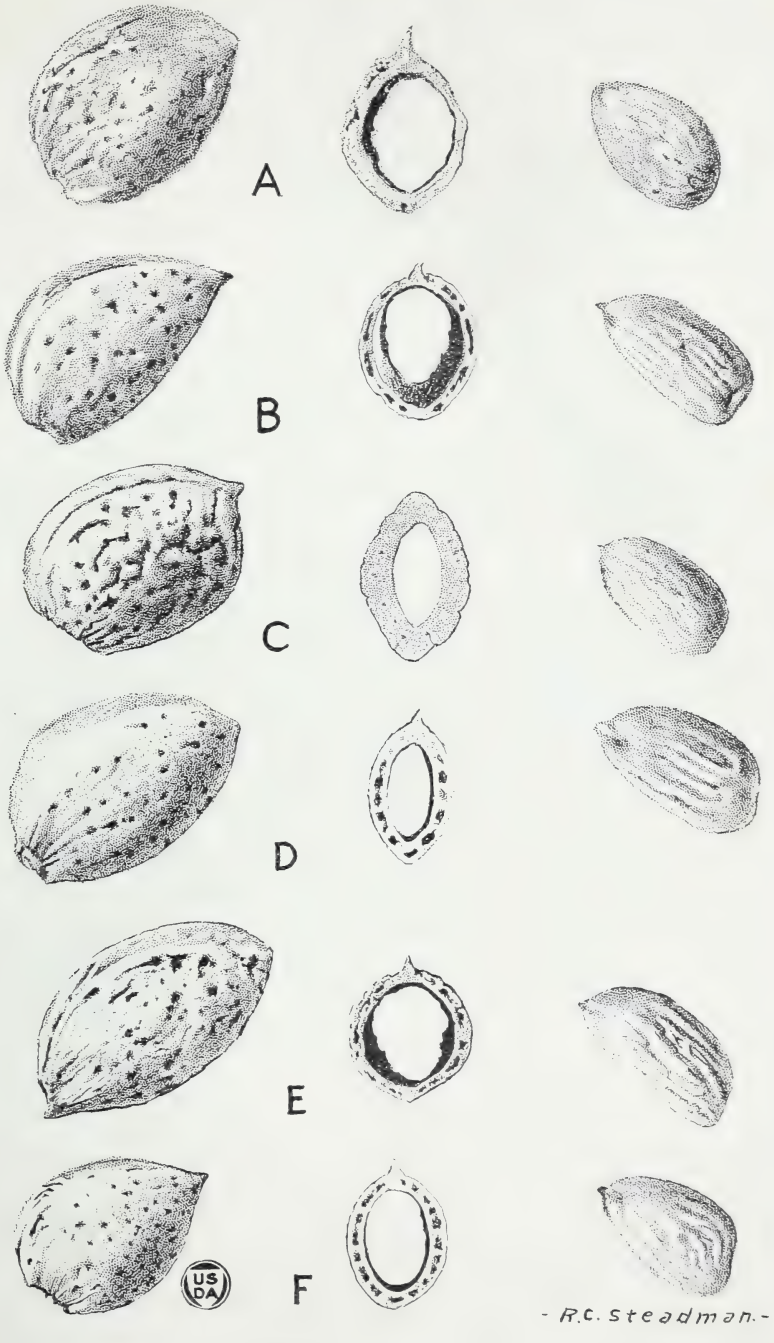
ALMOND VARIETIES.—XII

A, Pistache; *B*, Princess; *C*, Proctor; *D*, Provence; *E*, Queen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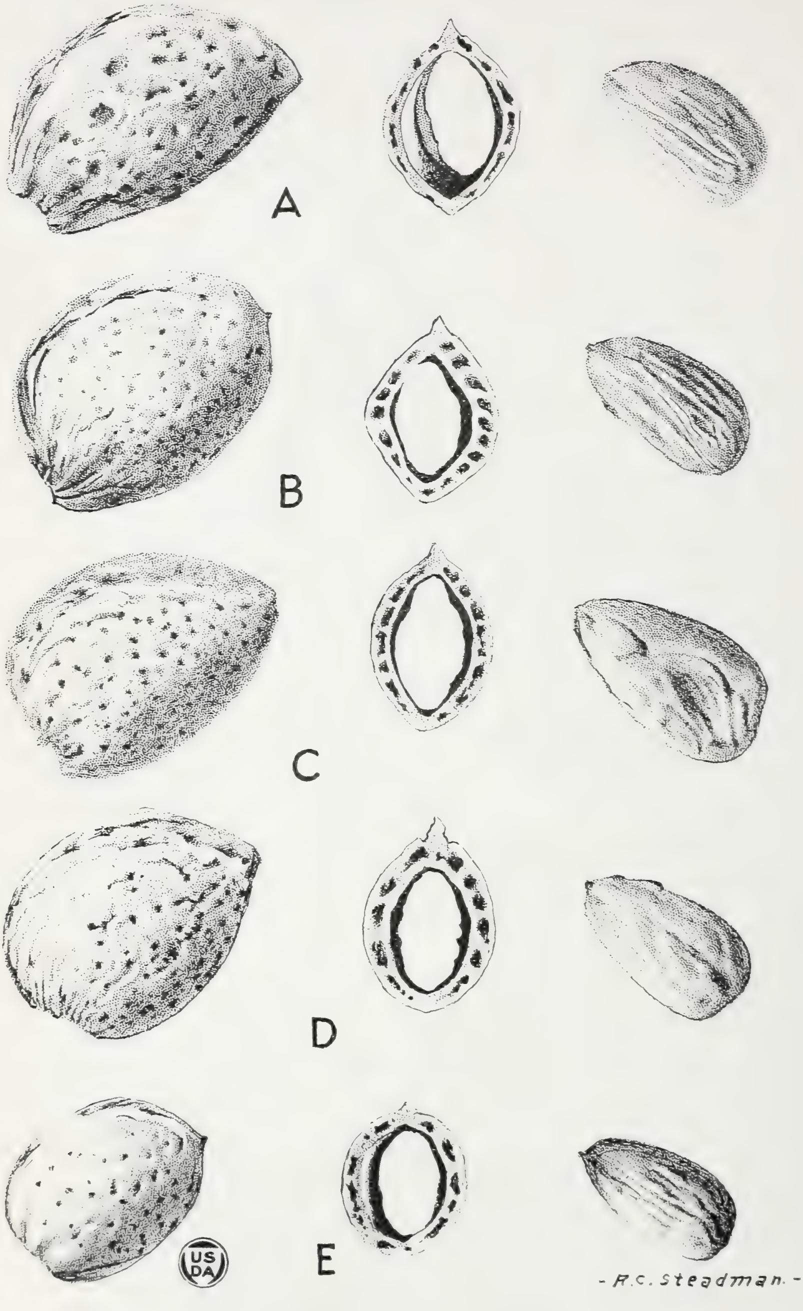
ALMOND VARIETIES.—XIII

A, Reams; *B*, Rice; *C*, Ridenhower; *D*, Routier; *E*, Sellers; *F*, Silvershell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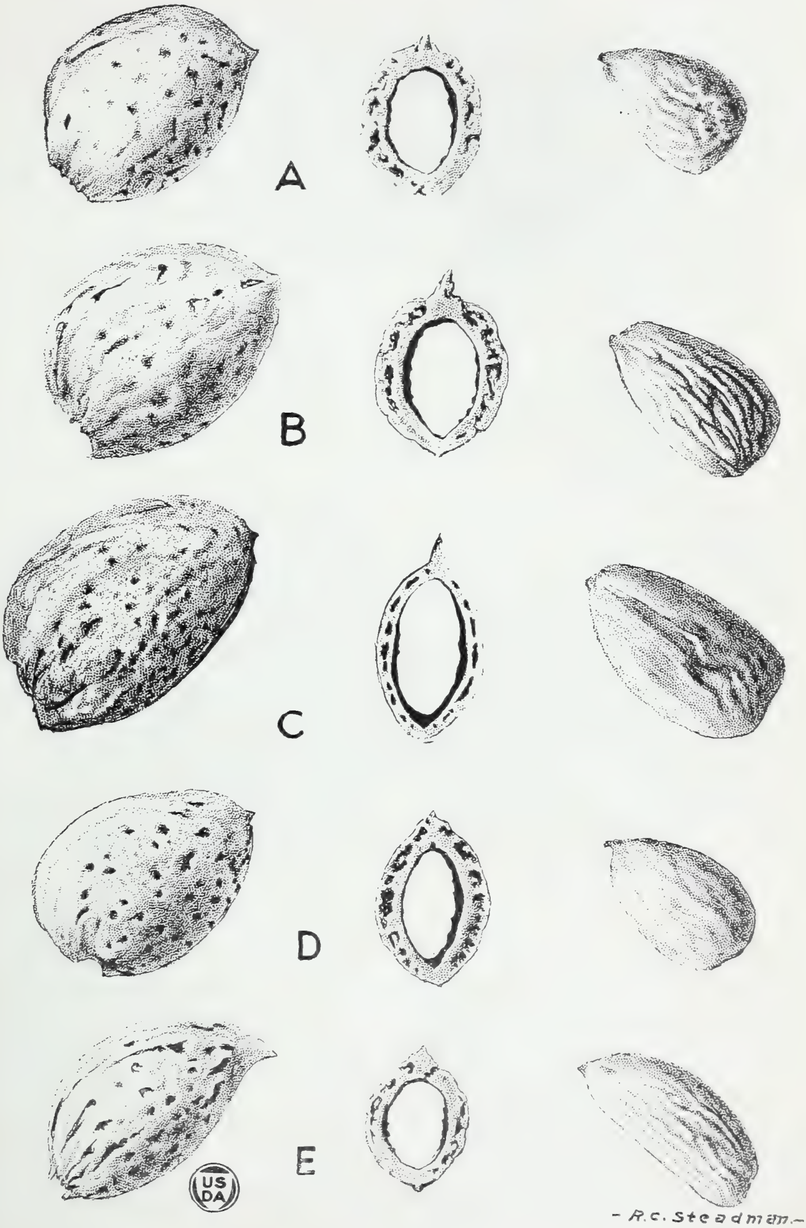
ALMOND VARIETIES.—XIV

A, Smith; *B*, Standard; *C*, Sultana; *D*, Tarragona; *E*, Texas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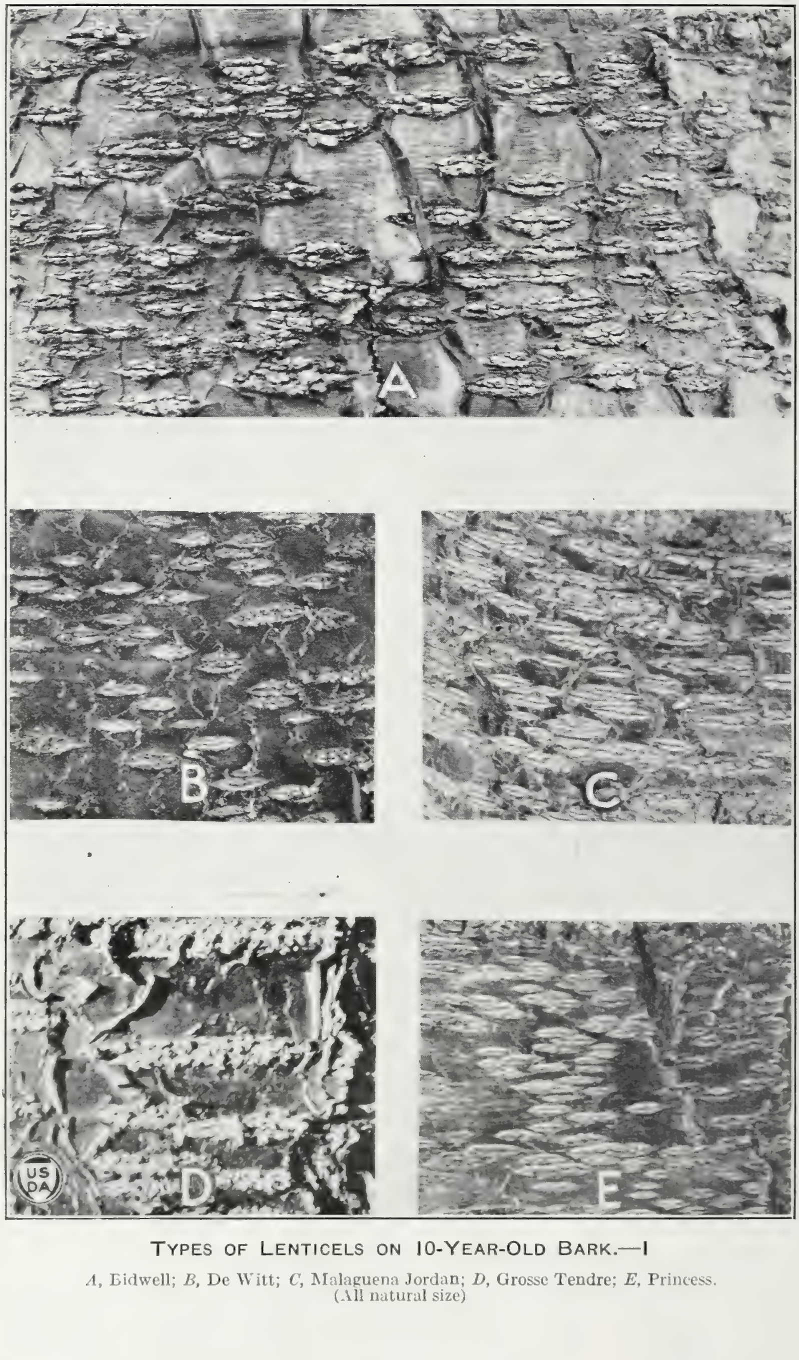
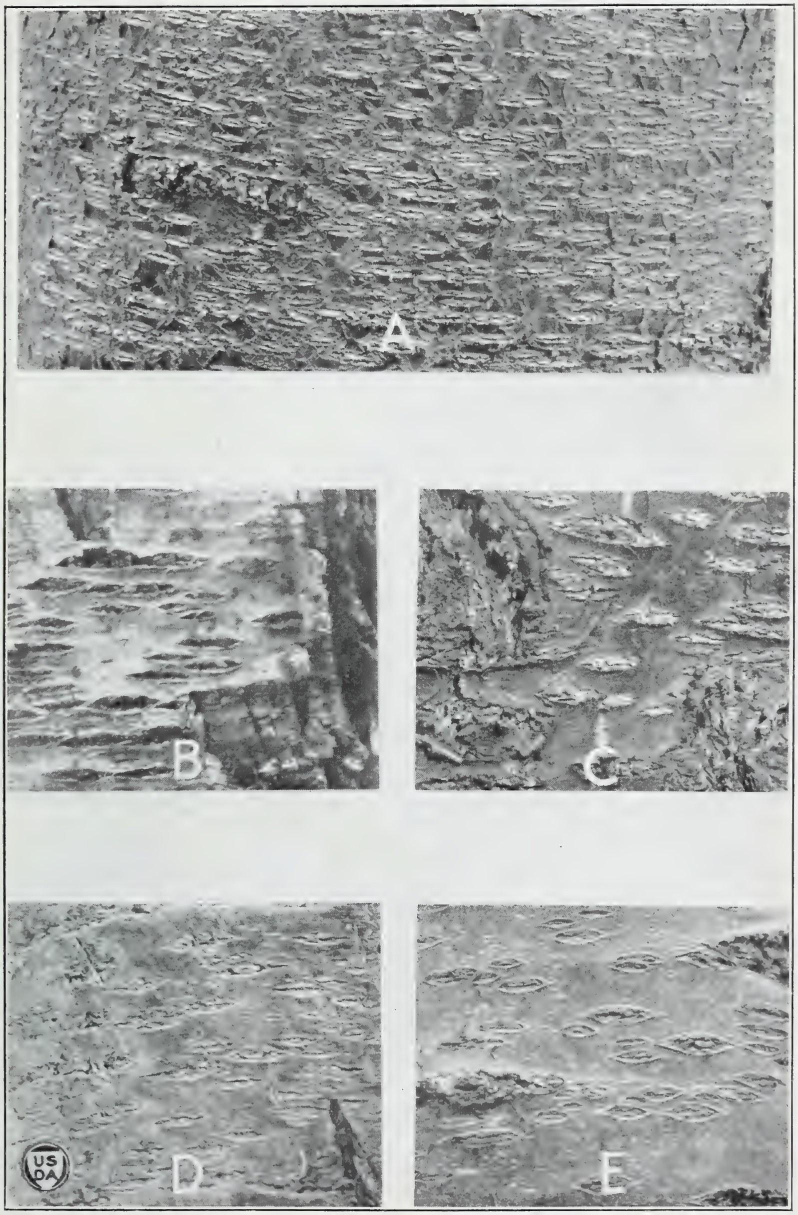
ALMOND VARIETIES.—XV

A, Acampo Texas; *B*, Soft-Shell Texas; *C*, Trembath; *D*, Walton; *E*, White Flat



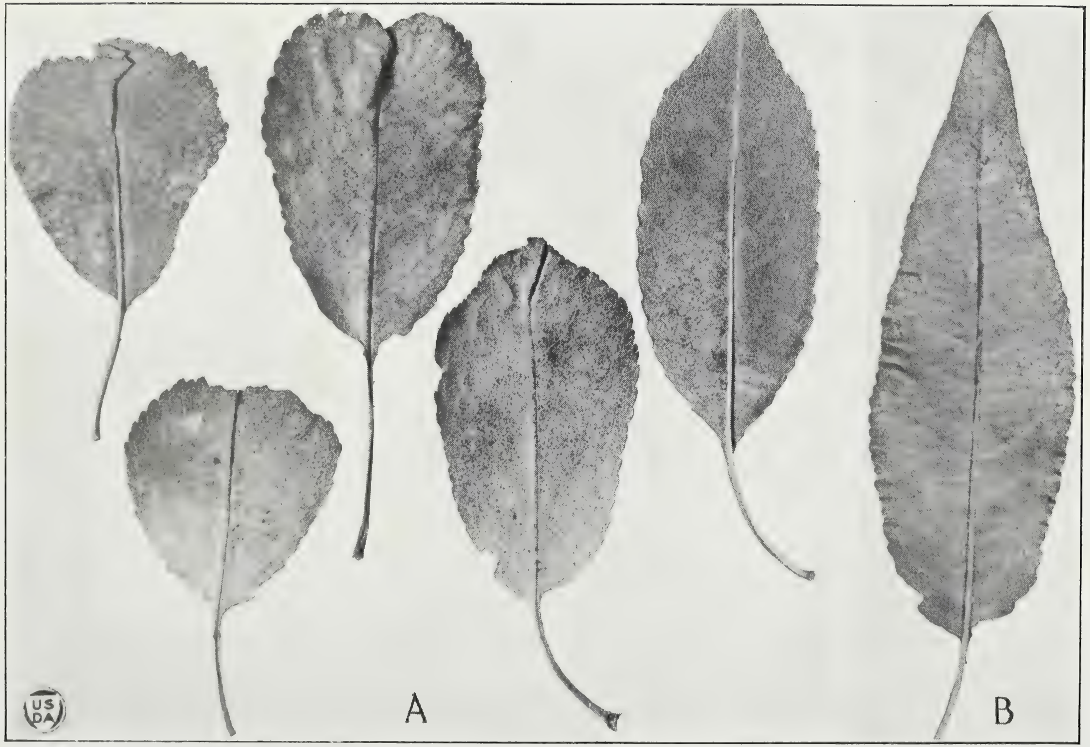
TYPES OF LENTICELS ON 10-YEAR-OLD BARK.—I

A, Bidwell; *B*, De Witt; *C*, Malaguena Jordan; *D*, Grosse Tendre; *E*, Princess.
(All natural size)



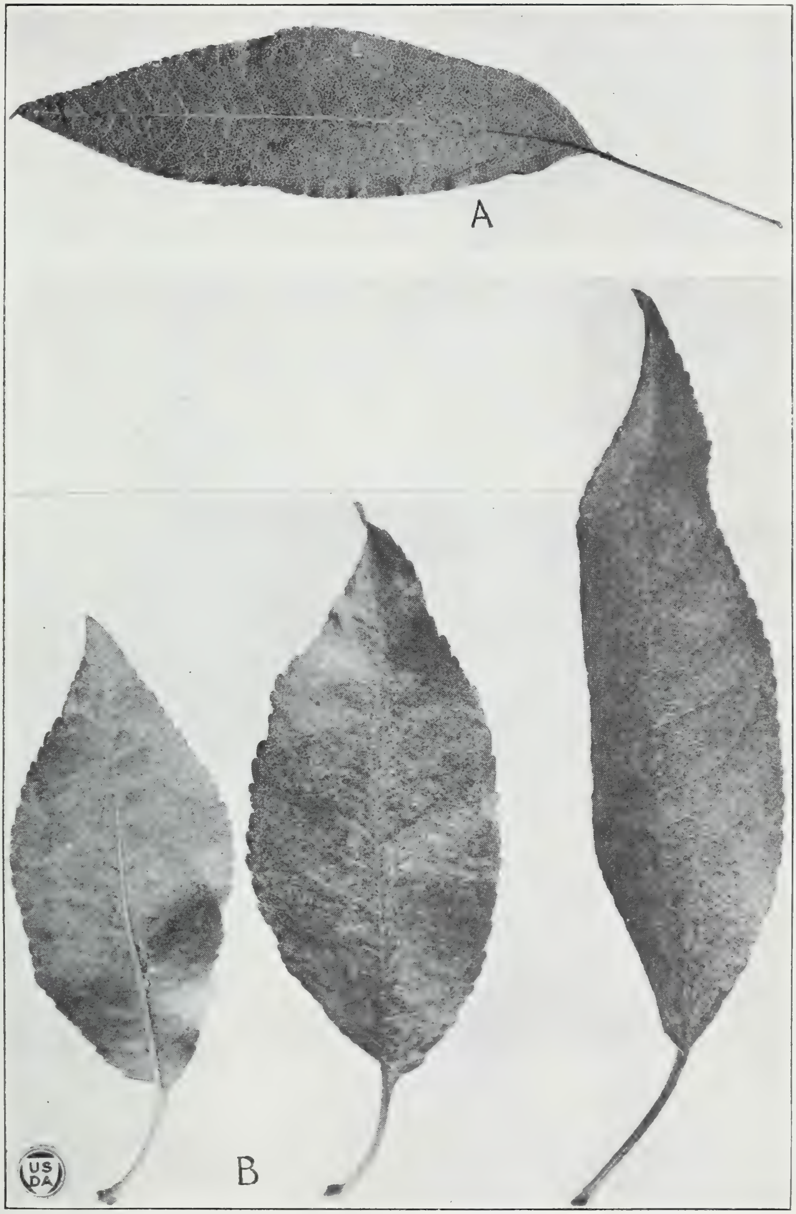
TYPES OF LENTICELS ON 10-YEAR-OLD BARK.—II

A, Crown; *B*, La Prima; *C*, Hudson; *D*, Nonpareil; *E*, Tarragona. (All natural size)



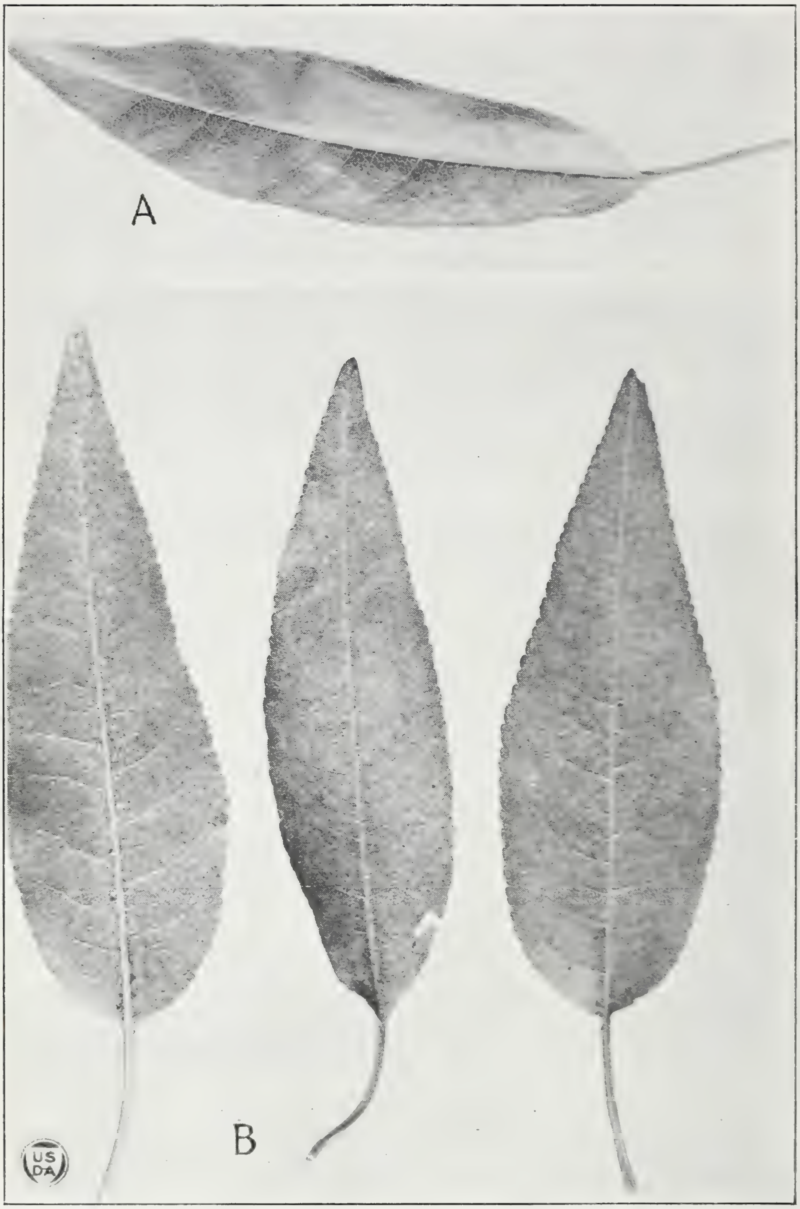
VARIATION IN LEAVES CHARACTERISTIC OF THE BIGELOW ALMOND

A, Off-type leaves; *B*, normal leaf. (All nearly natural size)



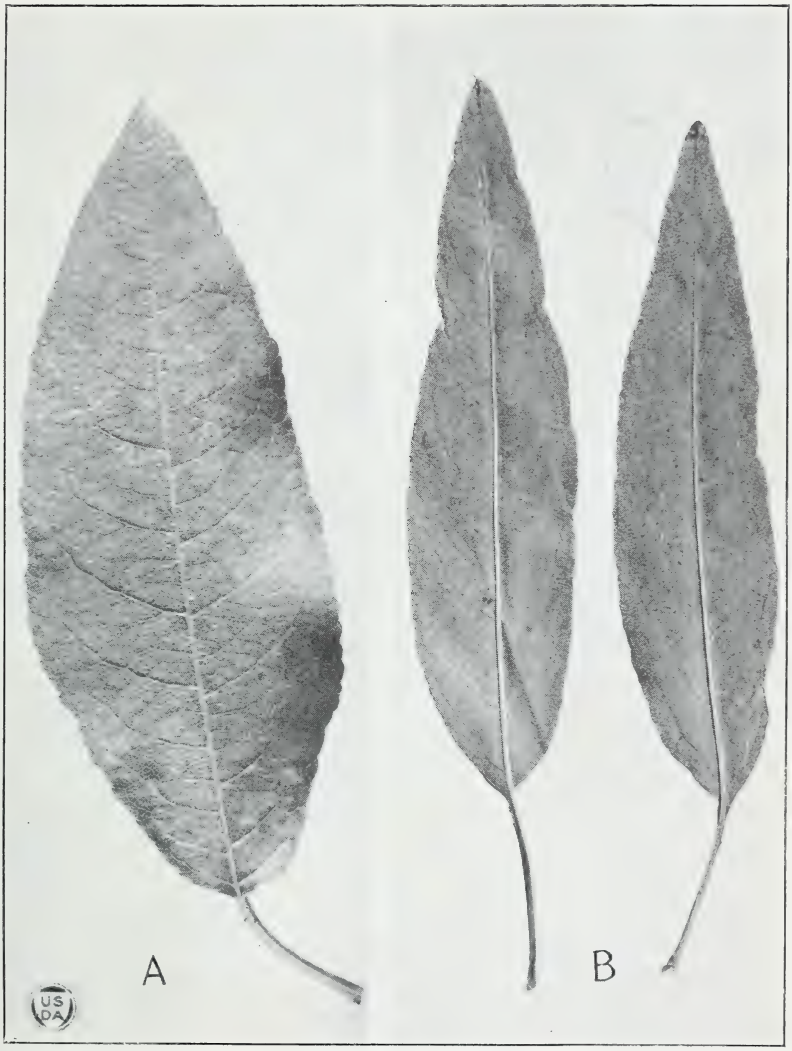
TYPES OF ALMOND LEAVES.—I

A, Leaf of Flint; *B*, leaves of Silvershell, showing variation



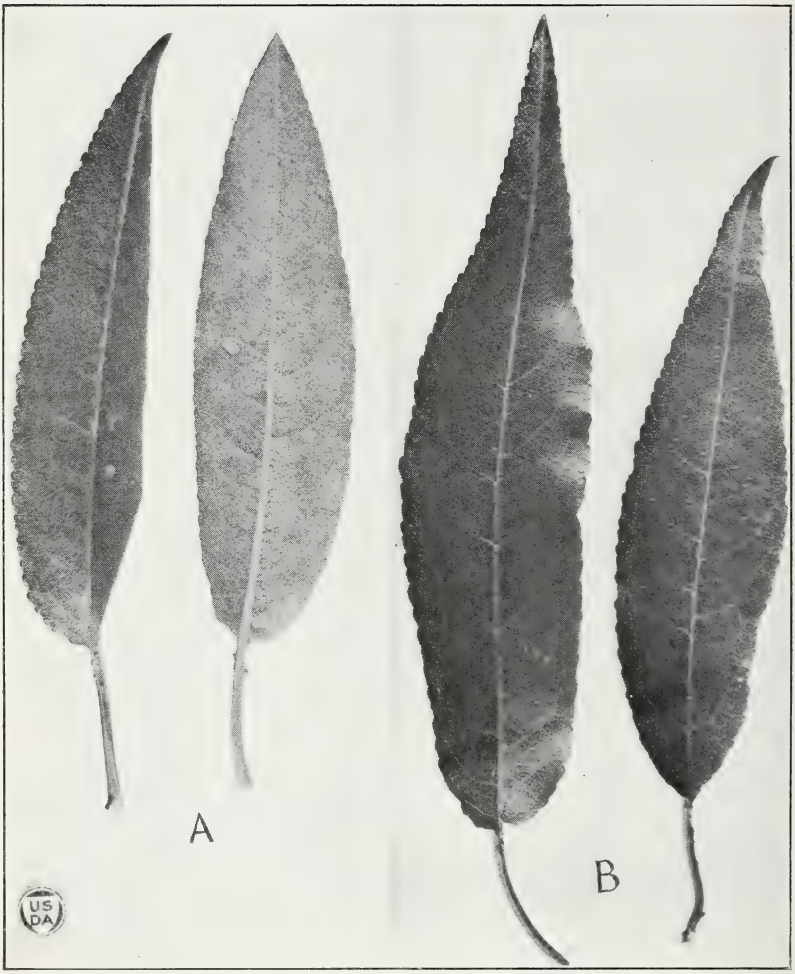
TYPES OF ALMOND LEAVES.—II

A, Leaf of Jordan (Rock type); *B*, leaves of I. X. L.



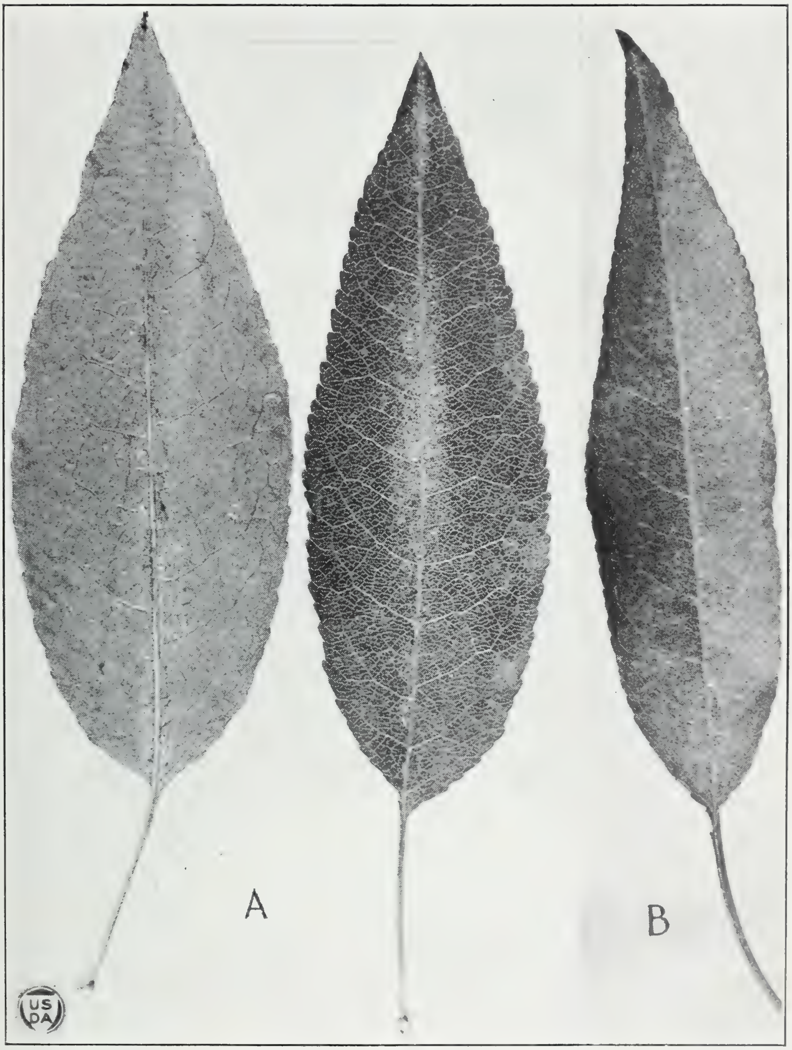
TYPES OF ALMOND LEAVES.—III

A, Leaf of Harriott; *B*, leaves of Barclay



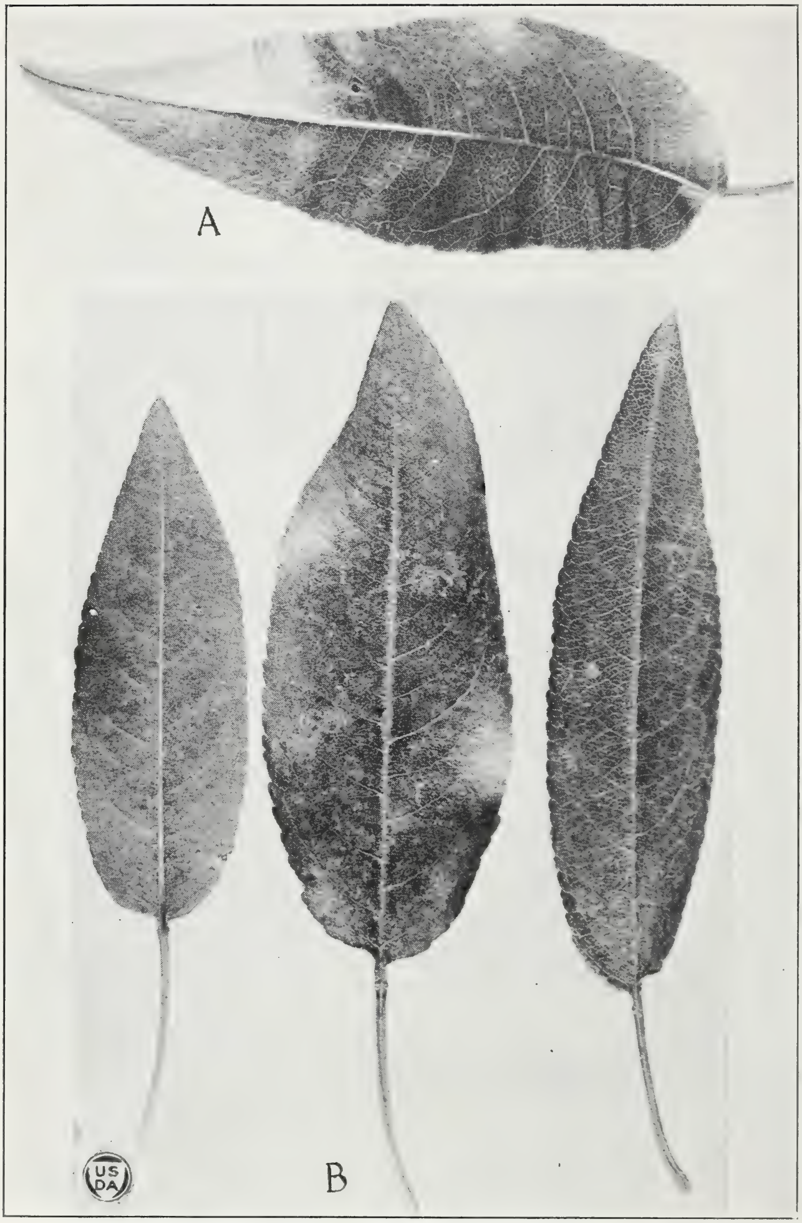
TYPES OF ALMOND LEAVES.—IV

A, Leaves of Drake; *B*, leaves of Peerless



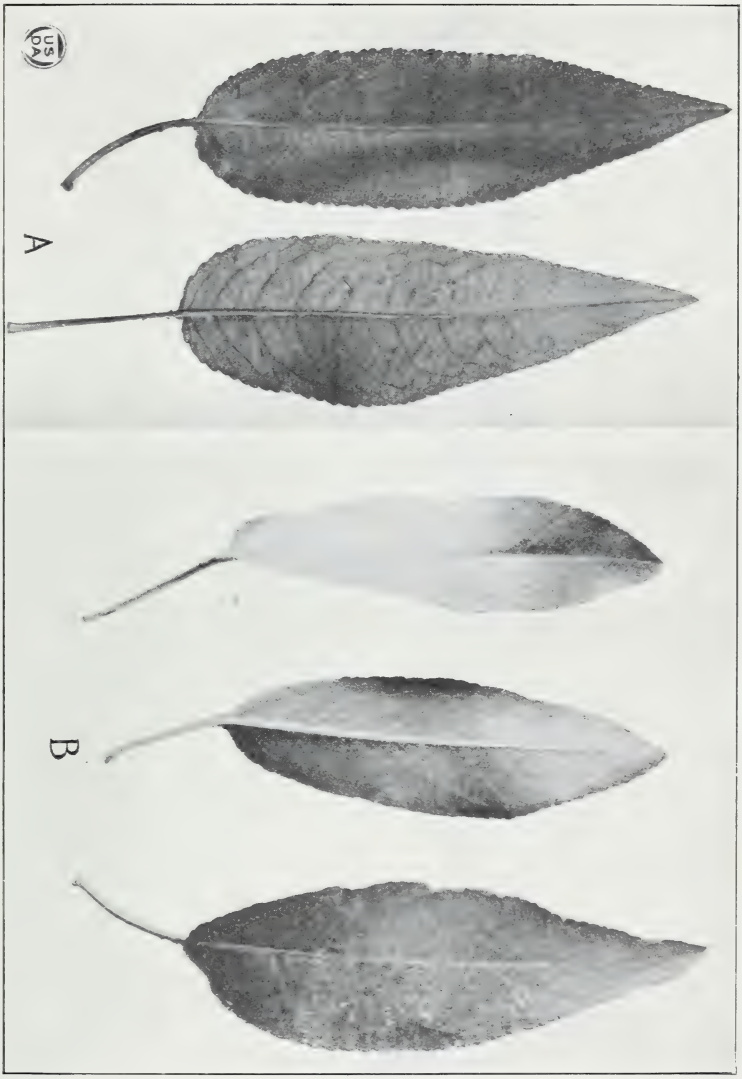
TYPES OF ALMOND LEAVES.—V

A, Leaves of Hudson; *B,* leaf of White Flat



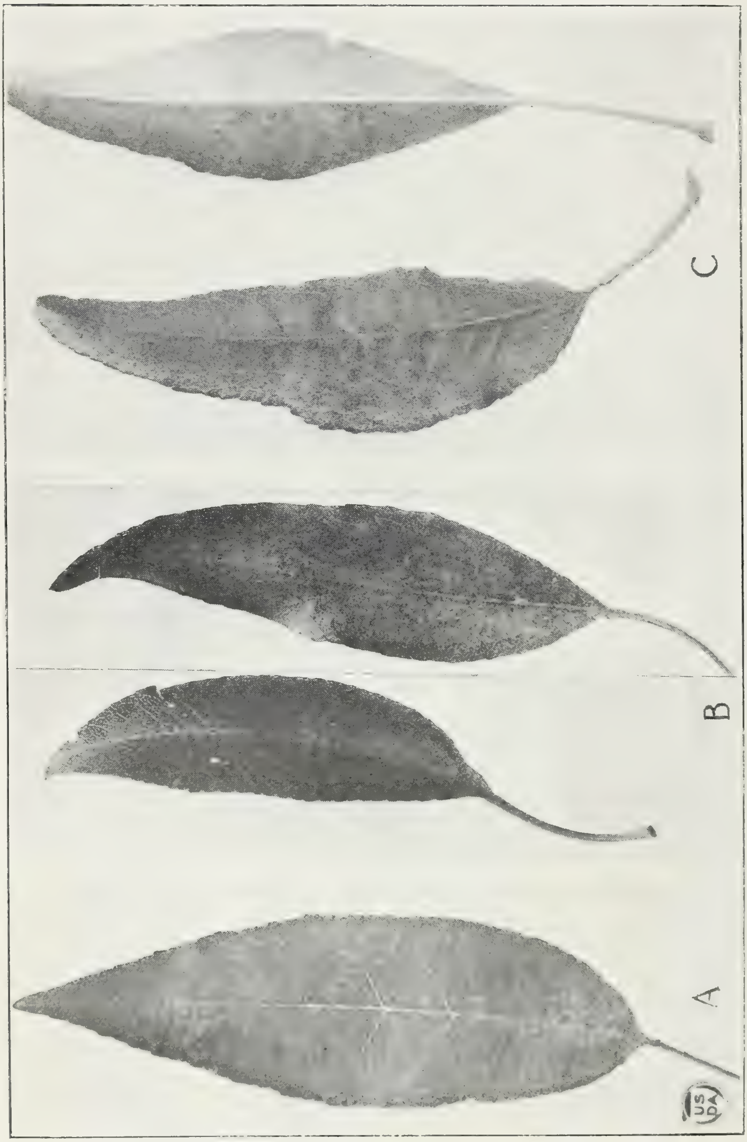
TYPES OF ALMOND LEAVES.—VI

A, Leaf of Princess; *B*, leaves of Nonpareil



TYPES OF ALMOND LEAVES.—VII

A, Leaves of Long I. X. L.; *B*, leaves of King



TYPES OF ALMOND LEAVES.—VIII

A, Leaf of Smith; *B*, leaves of Texas; *C*, leaves of Eureka

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November 12, 1924

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